Wiltelco 5000 Operating Manual

Summary of Major Devices

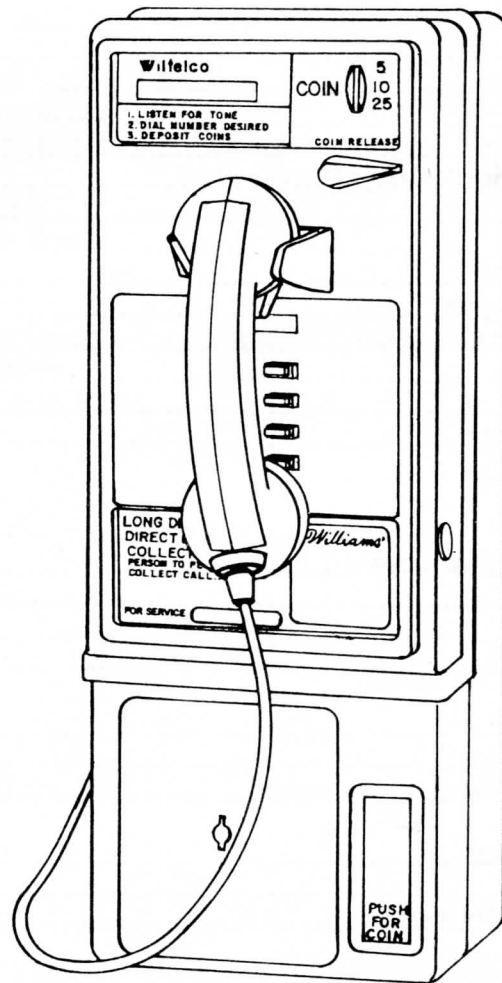| CHIP NO.	TYPE	BITS/CHIP	BOARD	ERROR DISPLAY	CHIP FUNCTION	PART NO.
U35	2764	8K x 8	CPU	ASAP TAKE ERROR!	EPROM for ASAP	A-5343-5000-1
U1	27256	32K x 8	ROM	8	Pgm 1 EPROM	A-5343-5000-3
U2	27256	32K x 8	ROM	9	Speech EPROM	A-5343-5000-4
U3	27256	32K x 8	ROM	10	Rate EPROM	A-5343-5000-5
U4	27128	16K x 8	ROM	11	Pgm 2 EPROM	A-5343-5000-2
U5	2864	8K x 8	ROM	U5 CKSUM ERROR!	250ns EEROM	5343-10979-00
U12	68B09	16/8 bit	CPU	ASAP TAKE ERROR!	ASAP MPU	5400-11051-00
U36	TC5517	2K x 8	CPU	ASAP TAKE ERROR!	CMOS RAM	5340-10959-00
U18	MC146818	RAM	CPU	No display	Clock RAM	5313-10958-00
U21	TC5517	2K x 8	CPU	Display flickers --one pixel on in every other charac-ter.	CMOS RAM	5340-10959-00

NOTICE

NOTICE

TO ORDER A REPLACEMENT ROM from your authorized *WILTELCO* distributor, specify: (1) part number (if available); (2) ROM label color; (3) revision number from ROM label; (4) telephone model where ROM is used. (5) U3 only: If you need a rate chip, specify your pay phone's area code and exchange.

WILTELCO 5000

OPERATING MANUAL

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"*WILTELCO 5000*" reg. U.S. pat. and TM office

WILTELCO 5000 OPERATING MANUAL

Contents

Contents, continued

Preface

YOU'VE PURCHASED THE VERY BEST!

THE PAY TELEPHONE MARKET is vast. But it's competitive. An operator who wants to compete effectively needs equipment with flexibility. And flexibility is what the *WILTELCO 5000* pay phone delivers.

YOUR *WILTELCO* PAY PHONE is a superior product of the highest technology. It has the features you need for the profit potential you want. Thanks for your very perceptive purchase!

WHY IT'S DIFFERENT

UNIQUE FIRMWARE makes the *WILTELCO 5000* phone easy to operate. Advanced 74HC logic and dual 6809 microprocessors achieve a new level of performance and reliability.

IT'S PROGRAMMABLE! These days, many telephones are still hard wired. With a brain of its own, your *WILTELCO 5000* adapts where hard-wired technology can't. Now you can customize your phone to its installation... Maximize your telephone profits! Simple programming allows you to optimize your phone's attributes. This manual shows you the secrets.

SEMINARS

TO MAINTAIN PEAK TELEPHONE PERFORMANCE, we recommend attendance at *WILTELCO* seminars. Your phone's automatic diagnostics can help untrained personnel locate problems. But only trained personnel can repair pay phones quickly and consistently. Make your seminar reservations today! For details, contact your *WILTELCO* distributor.

ABOUT THIS BOOK

AFTER YOU SET UP your phone using Chapter 2, use this book as a reference. Your first stop should be the programming chapters. Programming your phone for optimum performance is as important as setting it up. Proper operation requires that the time and date be accurately entered. In fact, correct rate charges are impossible without these settings.

PROFIT POTENTIAL. For your convenience, we've added numerous other adjustments. When you find out how simple programming is, you'll want to explore the many profitable possibilities. The bottom line is this: The more features you program into your phone, the more customers will depend on it. And the better your collections will be!

Chapter 1:
Introductory Information

Circuitboards, Components and Controls
Plug, Jack and Board Numbers
Summary of Major Devices (Part 1): inside-front cover

Summary of Major Devices (Part 2): inside-back cover
Warnings and Notices
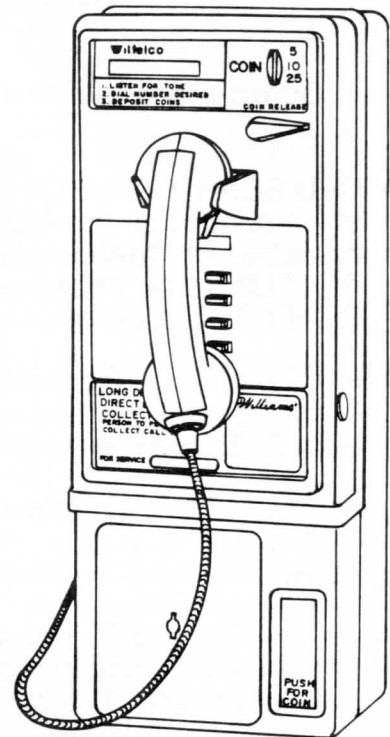
Circuitboards, Components and Controls

NOTICE

Board order follows the *WILTELCO* numbering system used in schematics.

(1) CPU BOARD. Your CPU Board (D-11057) contains both the main system and a slave computer, the ASAP (answer supervision, analog processor). This board must be equipped with the chips specified in the **Summary of Major Devices**. ROM U35 is on this board. This ROM contains the program for the ASAP system. ROM U35 is a programmed chip, so no substitution can be made.

(2) ROM BOARD. Use the C-11067 ROM Board. It should be equipped with chips shown on the **Summary of Major Devices**. ROMs for the main system are on this board. These are programmed chips, so no substitutions can be made.

(3) ANALOG BOARD. Use the D-11059 board. On this board are two trimmer pots, R27 and R15. Both pots are adjusted at the factory. But optimum settings vary depending on line conditions. You may need to tweak these pots.

R15 ADJUSTS THE SENSITIVITY of the click-detection circuit. The ASAP listens closely to the line. Phone software may interpret a click on the line as an answer. The setting of R15 helps to distinguish a noisy line from an answer. Adjustments are made with the phone in its Demo Mode. Demo Mode allows you to determine when ringbacks (line noises) are erroneously interpreted as answers. See Chapter 3, service number 02, feature 18 and Chapter 4, service number 06.

R27 ADJUSTS THE GAIN of the preamplifier for the AGC (automatic gain control) circuit. The signal-to-noise ratio of your telephone depends on this potentiometer.

(4) POWER-SUPPLY BOARD. Use the D-11071 board. This board has a 2ASB, 250V fuse. Note that the 5VDC logic supply is NOT located on this board. Instead the logic regulator is on the CPU Board. The Power-Supply Board feeds unregulated, filtered 15VDC to the logic supply. The logic supply returns regulated 5VDC to the Power-Supply Board. The Power-Supply Board also includes...

* Three bridge rectifiers

* A voltage tripler that feeds 100VDC to the escrow solenoid's steering circuit

* The steering circuit (bridge amplifier)

* 6.3VAC (biased at +5VDC) filament supply for the display

* 30VDC anode supply for the display

(5) DISPLAY BOARD. Use the C-11069 Display Board with a 5760-11020-00, 16-digit vacuum-fluorescent display tube.

(6) *No circuitboard is assigned to this number.*

(7) LINE-COUPLER BOARD. Use the C-11072 board equipped with relay 5373-11010-00.

(8) KEYPAD BOARD. Use the C-11073 board equipped with the 34-1019 keypad.

Plug, Jack and Board Numbers

WILTELCO PHONES USE A SPECIAL TECHNIQUE to name plugs and jacks. Each connector receives a number, a letter and a number. A hyphen separates the plug or jack-designation from the pin number.

For example, 1J3-3 refers to a connector at board 1. The jack (male or board) side of the connector is specified. The connector is identified as number three on the board. And pin number three is stipulated.

[ ] 1J1 is board 1, jack 1 (a CPU-Board jack).
[ ] 3P6 is board 3, plug 6 (an Analog-Board plug).
[ ] J-designations refer to the male part of a connector.
[ ] P-designations refer to the female part of a connector.
[ ] The prefix numbers for *WILTELCO* phones are listed below...

> 1--CPU Board
> 2--ROM Board
> 3--Analog Board
>
> 4--Power-Supply Board
> 5--Display Board
> 6--(not assigned)
>
> 7--Line-Coupler Board
> 8--Keypad Board
> 9--Cabinet
>
> 10--Handset

Warnings & Notices

WARNING

FOR SAFETY AND RELIABILITY, substitute parts and equipment modifications are not recommended.

USE OF NON-*WILTELCO* PARTS or circuit modifications may cause injuries or equipment damage.

SUBSTITUTE PARTS OR MODIFICATIONS may void FCC Type Acceptance.

THIS TELEPHONE IS PROTECTED by Federal copyright, trademark and patent laws. Unauthorized software or hardware modifications may be illegal under Federal law.

THIS "MODIFICATION" PRINCIPLE ALSO APPLIES to unauthorized facsimilies of *WILTELCO* logos, designs, publications and assemblies. Moreover, facsimilies of *WILTELCO* equipment (or any feature thereof) may be illegal under Federal law. Whether or not such facsimilies are manufactured with *WILTELCO* components, this rule applies.

WARNING

This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

WARNING

FCC LABEL. Check the front of your pay phone to see that an FCC-certification label was attached at the factory.

Telephones that leave *WILTELCO* plants comply with FCC Rules. The label is proof of this fact. If the label is missing, *legal repercussions to the telephone's owner and distributor* may result.

RF INTERFERENCE NOTICE

THIS PHONE'S CABLE-HARNESS PLACEMENT and ground-strap routing are very important. They are designed to keep RF radiation and conduction within levels accepted by FCC Rules.

MAINTAIN THESE LEVELS. Servicing may require that you disconnect harnesses or ground straps. When you're finished, reposition and reconnect them as they were.

Chapter 2:
Setup Instructions

Required Materials
Suggested Tools
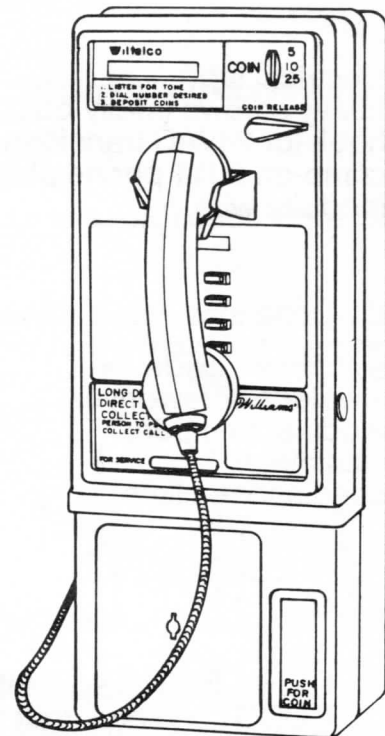Installing and Routing Your Telephone Line

Installing and Routing Your 24VAC Power Line
Wiring Your Pay Phone
Mounting Your Pay Phone

Connecting Your Pay Phone
Powering Up The WILTELCO 5000
Initial Programming

Analog-Board Adjustments

NOTICE

All wiring must conform to local building and electrical codes.

Required Materials

[ ] electrical tape
[ ] heavy screws (molly bolts)
[ ] hook for 24VAC transformer
[ ] crimp-on RJ11 phone plug
[ ] modular wire

[ ] shims
[ ] 60/40 rosin-core solder
[ ] stranded, 18 AWG wire: GRN
[ ] stranded, 18 AWG wire: ORN

Suggested Tools

[ ] electric screwdriver
[ ] jeweler's screwdriver
[ ] modular crimper
[ ] multimeter
[ ] needlenose pliers

[ ] phone-access keys (supplied)
[ ] soldering pencil
[ ] level (angle indicator)
[ ] standard screwdrivers
[ ] straight pin
[ ] wire cutters

Installing and Routing Your Telephone Line

[ ] 1. Locate the Network Interface Jack (NIJ). This jack is the link between your COCOT line and your pay phone.

[ ] 2. Open the cover of the NIJ. Connect wires to the right-hand screw terminals. Besides the terminals, the NIJ also contains the number of your COCOT line. Copy down this number.

[ ] 3. Insert a straight pin in the hole on the cover of the phone's number plate. Using the pin as a lever, pull the cover to the right. Write or type the number of the COCOT line on the number plate. Use the pin to return the cover to its original position.

[ ] 4. Test the line with a lineman's handset. Make sure you hear a dial tone on your line. Also, when a call is answered, the line must be quiet. Verify that this is the case.

[ ] 5. Route wires from the NIJ to your pay phone site. Avoid routing telephone wires near fluorescent lights or other inductive loads. Retest the phone line. If the noise is objectionable, install an RJ45S Coupler.

[ ] 6. Return to the NIJ. Until the phone has been mounted, connected and powered up, temporarily disconnect the NIJ.

Installing and Routing Your 24VAC Power Line

[ ] 7. Find a wall outlet near your pay phone site. To prevent malicious or accidental power loss, this outlet should be inaccessible to the public. This wall outlet has to be on constantly. Other equipment on this line must not draw a heavy load.
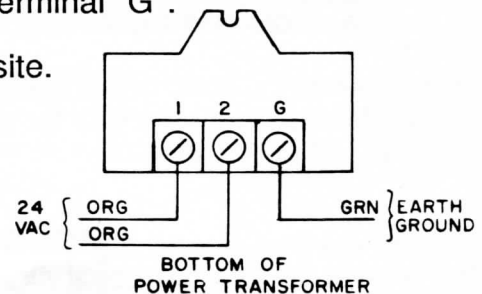
[ ] 8. Mount a hook within six inches of the wall outlet. Hang the power transformer on this hook.

WARNING

  For safe phone operation, the wall outlet's ground terminal must be connected to earth ground.

[ ] 9. If your wall outlet is over three feet from your phone site, proceed. Otherwise, skip steps 10 through 13.

[ ] 10. In this step, use 18 AWG, multistrand, insulated wires. Each wire should be long enough to reach from your power transformer to the inside of the phone. On the transformer, connect an orange wire at terminal "1." Do the same at terminal "2". Then connect a green wire to terminal "G".

[ ] 11. Route these three wires to your pay phone site.


```
            1    2    G
          |⊘|  |⊘|  |⊘|
  24 { ORG                    GRN {EARTH
  VAC { ORG                        {GROUND
            BOTTOM OF
         POWER TRANSFORMER
```

[ ] 12. At your phone site, plug in the transformer. Check that you have 24VAC across the two orange wires. Now check for no potential (normal) from the ground wire to a nearby ground.

[ ] 13. Before you connect the power or telephone wires to your phone, unplug the transformer.

Wiring Your Pay Phone

[ ] 14. Insert the square-headed key into the lower-right phone lock. Rotate the key as far as it goes.

[ ] 15. Insert the large "T" key into the upper-right lock. Rotate this key as far as it goes.

[ ] 16. Now the upper housing is free. Slide it toward you. Be careful that the front housing does not fall off the phone.

[ ] 17. Open the phone. Set the front housing before the phone.

[ ] 18. Disconnect the ribbon cables at the display and keypad boards.

[ ] 19. Unplug the two green ground wires. Disconnect one from the housing and the other from the keypad board.

[ ] 20. Remove the display-power connector from the jack on the power supply board.

[ ] 21. Carefully set aside the front housing.

[ ] 22. Telephone and power lines enter the back of the phone through a central, oval hole. For indoor installations, remove the rubber plug from the oval hole.

[ ] 23. If your wall outlet is over three feet from your phone site, proceed. Otherwise, skip steps 24 through 28.

[ ] 24. Clip the four wires emerging from the oval hole in the back of the phone. (Three of these wires go to the transformer and one to the RJ11 plug.)

[ ] 25. Next, pull the ends of those four wires into the phone. The ground wire is green.

[ ] 26. Find the gray, two-position connector on the front, left side of the power supply. Insert a jeweler's screwdriver in one of the slots on the connector's left side. Apply slight pressure to the screwdriver. Remove the two orange wires and discard them.

COMPONENT VIEW
(WITH FRONT HOUSING OFF)
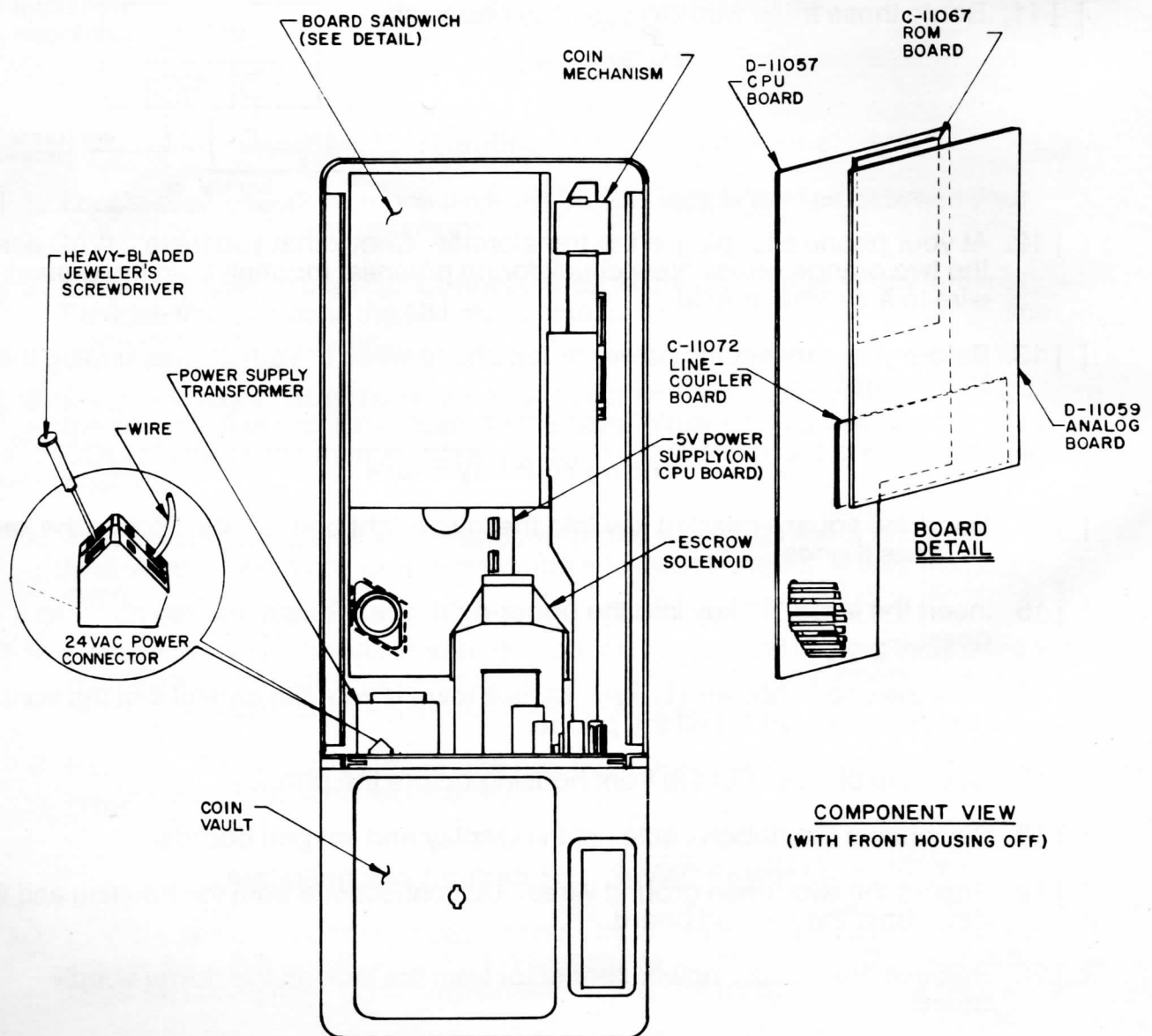
[ ] 27. Pull out the free, wire end of the RJ11. Strip an inch and a half of outside insulation from the wire.

[ ] 28. You only need the center two conductors from the RJ11, so clip the outside conductors.

[ ] 29. Route the new telephone and power wires under the backplate and through the backplate's oval hole.

Mounting Your Pay Phone

CLIP

CLIP OUTSIDE WIRES
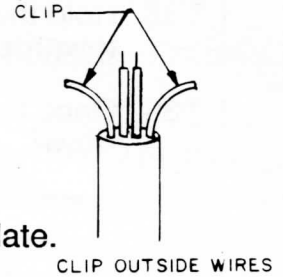
[ ] 30. Using two heavy screws, mount the backplate on the wall.

[ ] 31. Using two heavy screws, mount the pay phone to the backplate.

[ ] 32. For this step, use either a spirit level or a horizontal/vertical angle indicator. Adjust the pitch of the phone to within a degree and a half of vertical. Shim the backplate until the pay phone is vertical from side to side. Use the same technique to level the phone from front to back.

[ ] 33. The chart shows the allowable distance between the phone and the bottom of the spirit level. This distance, "t," varies slightly according to the level used. Four examples are provided. Check to see that the space between telephone and wall approximates "t."

CAUTION

Failure to level your phone will compromise the accuracy of the coin mechanism.

"t"

FLUID LEVEL — WALL

LEVELING THE PHONE
(SIDE VIEW)
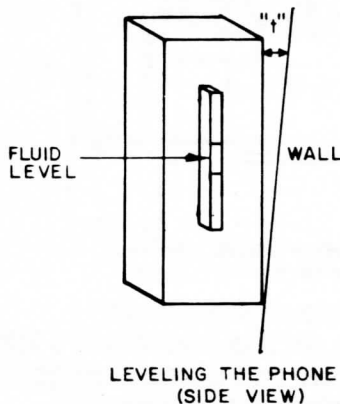
Spirit Level Length (inches)	Distance "t" (inches) from Spirit Level to Phone
18	15/32
24	5/8
30	25/32
36	15/16

[ ] 34. Temporarily remove the pay phone from the backplate.

[ ] 35. Using at least seven heavy screws or molly bolts, mount the backplate to the wall.

CAUTION

Prevent prying! Seal gaps between the mounting surface and the backplate!

[ ] 36. Pull the wires through the oval hole. At least 12 inches of wire should protrude from the backplate. Angle the wires down at about 45 degrees.

[ ] 37. Pick up the pay phone without the front housing. Feed the wires from the backplate's oval hole into the oval hole on the phone. Look inside the phone, beneath the Analog Board and right of the CPU Board. Find the wires you're feeding in the back.

[ ] 38. Hold the pay phone against the backplate. Grasp the wires and pull them towards you.

[ ] 39. Once the wires are taut, place the pay phone against the backplate and bolt it down.

Connecting Your Pay Phone

NOTICE

The type of splice you use in the next step depends on local building codes. A soldered splice is described here. However some codes may specify plastic wire splices, wire nuts, etc.

[ ] 40. Splice the green wire (ground) from the backplate to the free green wire in the phone. (This second wire is the one you clipped in the section **Wiring Your Pay Phone**.) Solder your splice and insulate it with electrical tape.
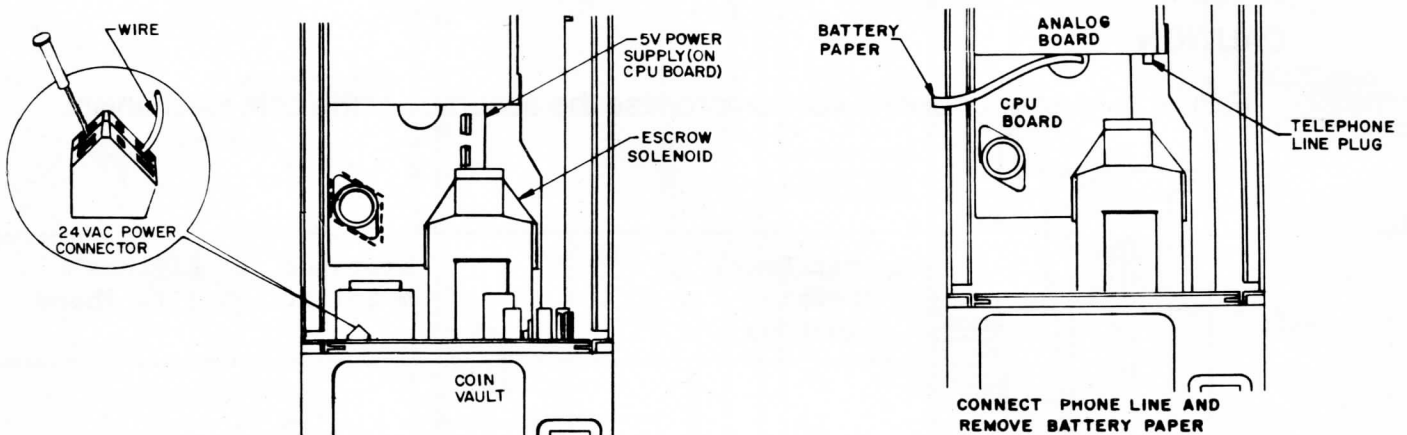
[ ] 41. Find the gray, two-position connector on the front, left side of the power supply. Insert a jeweler's screwdriver in one of the slots on the connector's left side. Apply slight pressure to the screwdriver. Now insert one of the orange wires into the adjacent, right-side slot. Use the same technique to insert the other orange wire into the remaining slot.

[ ] 42. Crimp an RJ11 modular jack on the end of the telephone line.

[ ] 43. Connect the telephone line to the plug on the bottom of the Line-Coupler Board. This plug is near the coin mechanism.

[ ] 44. Find the battery clip. It's under the larger ribbon cable and near an LED. Remove the paper from the battery holder. This step activates the power-failure batteries for the real-time clock.

[ ] 45. The next several steps cover reattaching the front housing. Connect the ribbon cables to the Display and Keypad Boards. For safety, these aren't interchangeable.

[ ] 46. Plug in the two green ground wires. One goes to the housing and the other goes to the Keypad Board.

[ ] 47. Plug the display-power connector into the jack on the Power-Supply Board.

[ ] 48. Insert the square-headed key into the lower lock on the front housing. Rotate the key counterclockwise as far as it goes.

[ ] 49. Now insert the large "T" key into the upper lock. Rotate this key clockwise as far as it goes.

[ ] 50. The front housing is ready for mounting on the phone. Slide it toward the phone. Be careful that the front housing does not fall off the phone.

[ ] 51. Remount the front housing by turning the two keys as far as they go. (Turn the "T" key counterclockwise and the square-headed key clockwise.) Remove the keys. Verify that the housing is locked in place.

Powering Up The WILTELCO 5000

[ ] 52. Plug in the wall-mounted transformer. Check marks should appear on the display. They indicate successful completion of Power-Up Diagnostics.

[ ] 53. If Power-Up Diagnostics find an error, a message will appear on the display. Error codes are defined in Chapter 5 of this manual. Upon power-up, the messages CMOS CKSUM ERROR and CLOCK SET ERROR! are normal. These indicate that the real-time clock needs to be set.

[ ] 54. Connect the telephone line to the NIJ.

Initial Programming

[ ] 55. Place the square-headed key in its right-side lock. Turn the key.

[ ] 56. Use the keypad to enter the password, 111-111.

[ ] 57. Enter the service number for the service-configuration section, 02.

[ ] 58. Enter 04.

[ ] 59. Using a four-digit number, set the month. For example, January 1 is 0101. If you make an error before entering all four digits, you can easily delete it. Use the * key.

[ ] 60. Enter *. You should see the prompt YEAR? 1986.

[ ] 61. Enter the four digits of the current year.

[ ] 62. Advance to the day-of-week feature by entering *.

[ ] 63. Enter the number (one through seven) of the day. Numbering starts with one for Sunday. Since phone rates vary according to time and day, accuracy is very important.

[ ] 64. Advance to the time-of-day feature by entering *.

NOTICE

Your WILTELCO 5000 phone displays a modified version of a.m./p.m. time. A properly-adjusted phone displays 12 p.m. at 12 midnight. Furthermore a properly-adjusted phone displays 12 a.m. at 12 noon.

[ ] 65. Convert the present time to standard military time. (For example, if you install your phone at 11 p.m., set the clock to 230000. Midnight translates to 000000 and noon is 120000.) Enter the resulting figure. Enter #.

[ ] 66. To exit section 02, enter another #.

[ ] 67. Enter the service number for the advertising section, 05.

[ ] 68. Enter *.

[ ] 69. See the ASCII table in Chapter 3. One character at a time, enter the number of your COCOT line. Key * between characters.

[ ] 70. Enter 001. Press *.

[ ] 71. Enter 031.

[ ] 72. Turn the key and remove it. The phone should reset and pass diagnostics with a "checkmark" display. After the WILTELCO messages, the phone should display its number, the time and the date. During a power failure, the batteries will keep the CMOS real-time clock running.

CAUTION

Hardware setup must be promptly accompanied by programming. This chapter familiarizes you with a few programming basics. But programming barely begins here. Timely collections, accurate bookkeeping and proper maintenance all depend on your service-number entries.

Here are some examples of how programming optimizes phone operation...

* If your phone malfunctions or has a full cashbox, it can call you and report. Of course these features only work after you enter your office phone number into memory.

* If your phone will be used on noisy lines, adjust service number 06. This adjustment tailors phone performance to your phone line.

* Your phone can display any message up to 512 characters long. As you've just learned, entering your message is very easy. Chapter 3 details ways of enhancing your message. These include scrolling, flashing and operator-designed characters.

* On local holidays, special rates may apply . You can enter these holidays into your phone's memory.

Analog-Board Adjustments

Your *WILTELCO 5000* phone is designed to operate under various telephone line conditions. Usually adjustments aren't required. However, if the following problems occur, minor adjustments are warranted:

* Your pay phone takes a deposit during a ring or busy signal.

* Two seconds after the remote answer, your pay phone's microphone remains muted.

ADJUSTMENT PROCEDURE

[ ] 1. Leaving connectors attached and power on, remove your phone's front housing. Identify the Analog Board, which is left of the coin mechanism.

[ ] 2. There are two potentiometers on the bottom half of the Analog Board. Using a jeweler's screwdriver, you can adjust these pots through access holes in the board. No further disassembly is required. The top, left-hand control is click-detect pot R15. The bottom-right control is gain pot R27.

[ ] 3. Identify each pot. Imagine that each pot is a clock. Record the hour position of each pot's slotted arrow.

[ ] 4. Turn click-detect pot R15 fully counterclockwise, approximately one revolution.
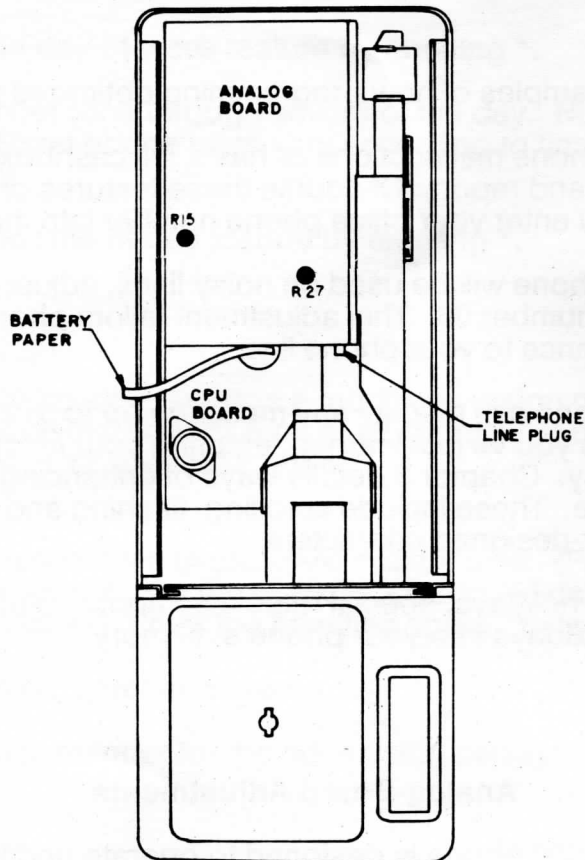
[ ] 5. Determine symptoms by making 10 or more test calls to different areas.

* DEPOSIT TAKEN DURING A RING OR BUSY SIGNAL (too much gain).
  Reduce gain: Turn gain pot R27 clockwise about two hour positions.

* MICROPHONE REMAINS MUTED two seconds after the remote answer (too
  little gain). Increase gain: Turn gain pot R27 counterclockwise about two
  hour positions.

[ ] 6. Make another set of test calls. As necessary, adjust gain pot R27 one hour
       position at a time.

[ ] 7. See your notes from step 3. Restore click-detect pot R15 to its factory-set
       position.

[ ] 8. If symptoms persist, adjust click-detect pot R15 one hour position at a time:

* DEPOSIT TAKEN DURING RING OR BUSY SIGNAL. Decrease the click-
  detection threshold. Turn R15 counterclockwise.

* MICROPHONE REMAINS MUTED. Increase the click-detection threshold.
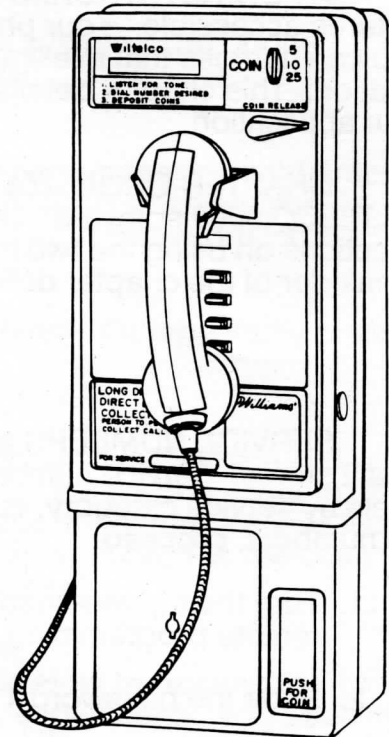 Turn R15 clockwise.

Chapter 3:
Programming Procedures

About This Chapter
Software Access
The * Key

The # Key
Using the Service Numbers
How to Access the 12 Service Numbers
Service Number Definitions

     (01)   Cashbox
     (02)   Service Configuration
     (03)   Passwords

     (04)   Diagnostics
     (05)   Advertising

About This Chapter

A FEW KEYSTROKES on the Touchtone™ pad make all *WILTELCO 5000* features accessible. Your phone's incredible versatility results from its intelligence. You can harness that intelligence and optimize performance and features to your location. This chapter details the simple procedures you'll use to tailor the phone for your application.

CHAPTER ORGANIZATION. Each section of this chapter describes a function of *WILTELCO 5000* software. The first section details how to access the software. Directions on using the two multifunction keys, * and # are also included. The remainder of the chapter defines the the first five "service numbers."

Software Access

SERVICE NUMBERS are used to program the *WILTELCO 5000* phone and read data it stores. Service numbers are arranged like an outline. They're organized into levels by service category, category feature, and feature setting, respectively. To use the numbers, proceed...

[ ] 1. Turn the square-headed phone-access key in its right-side lock. Or for remote programming, just call the phone.

[ ] 2. Enter the password 111-111.

[ ] 3. Now you can access the service numbers in two ways...

    Option A: Press the phone's * key. The phone displays a prompt asking if the service shown is the one you desire. Answer "Y" (yes) by pressing the 9 key. Or answer "N" (no) by pressing the 6 key.

    Option B: Enter the two-digit service number. If the desired number is one, either enter 1 and # , or enter 01. The phone responds by displaying the prompt for service category 01.

The * Key

The * key has more than one function. If you enter the wrong number, use * to erase the incorrect entry. Now you can try again. To advance to the next service category, you also press the * key.

The # Key

is also a multifunction key. Use # to enter a number with less than the maximum number of digits. Remember, service numbers are arranged like an outline. They're organized into levels by service category, category feature and feature setting, respectively. Use # to exit from one level and enter the next higher level (e.g., from category feature to service category).

Using the Service Numbers

GETTING STARTED. Use the password to enter the system. The phone displays WHICH SERVICE? and says "dial service number."

SERVICE CATEGORIES. To browse through the service-category numbers, press * . The phone responds by saying "number X is no." (In this explanation, X represents a service's number.) The phone skips numbers your password isn't authorized for.

To enter a displayed service number, press 9 for Y (yes). Or repeatedly press * until you arrive at the desired number.

WHEN YOU ENTER A SERVICE CATEGORY, the phone says "Service X. Dial code number." At this point you have two options: (1) Enter the code number for the desired feature. (2) Or repeatedly press * until you arrive at the correct service type. The phone responds by saying "number Y at Z." (In this explanation, Y is the code number you just entered. Z is the setting for that code number.)

IF ALL THIS SEEMS COMPLICATED, try it. The table **How to Access the 12 Service Numbers** summarizes the procedure. After a few experiments, you'll see that adjusting and reading phone settings is quite easy.

Subsequent pages include another table. In numerical order, this details the first five service categories and their factory settings. The remaining seven service numbers are discussed in Chapter 4.

NOTICE

REMOTE PROGRAMMING must be done from a tone telephone. Pulse (rotary or pushbutton pulsar) phones are unacceptable for this purpose. However pulse phones with tone adapters can successfully program the *WILTELCO 5000* pay phone.

PLAN AHEAD. When you remotely program the pay phone, keep a written list of your changes handy. This list should include the changes you plan to make. It should also include everything you plan to key into the phone. Design your list in step-by-step fashion. Check off each step as you complete it. The table below should also be helpful.

How to Access the 12 Service Numbers

STEP	ACTION	OPTIONS	PHONE RESPONSE
1	Access phone's service section	[ ] On-site, with key [ ] Remotely, by dialing phone's number [ ] Remotely, by computer	Displays PASSWORD:
2	Enter password	[ ] Six-character password (no alternative)	Displays WHICH SERVICE? Says "dial service number."
3	Enter category number of desired service	[ ] 01: Cashbox [ ] 02: Configuration [ ] 03: Passwords [ ] 04: Diagnostics [ ] 05: Advertising [ ] 06: Phone Number Mode [ ] 07: Rate Tables [ ] 08: Bookkeeping [ ] 09: Callbacks [ ] 10: Holiday Tables [ ] 11: Hour Tables [ ] 12: Restore or Clear Settings	Displays first category feature and the setting for that feature. Says "service X. Dial code number." (The service's number is substituted for X.)
4	Enter a new setting for a category feature	[ ] 9 for yes [ ] 6 for no [ ] numbers as keyed [ ] * to enter setting and advance to next feature [ ] # to select a new category	Displays and says the feature and setting numbers.
5	Exit service section	[ ] Turn key [ ] Hang up [ ] Execute hangup routine on modem	Phone shuts down, runs diagnostic routine, and after initialization, incorporates changes.

Service Number Definitions

SERVICE NUMBER	CODE NUMBER	FEATURE OR APPLICATION
01 Cashbox	CONCEPT (no code numbers) NOTICE	For the person who collects money from the cashbox. A prompt ($X.XX CLR? N) shows the amount collected since the number was last cleared. To clear this service number, press 9. RETURNING THE CASHBOX TO THE VAULT. To return the cashbox to its vault, the collection agent must follow this procedure. [ ] Insert a coin into the screw inside the cashbox lid. [ ] Turn the screw clockwise as far as it goes. [ ] Close the cashbox door. [ ] Push the cashbox into the vault.

SERVICE NUMBER	CODE NUMBER	FEATURE OR APPLICATION
02 Service Config- uration	CONCEPT	Phone setup familiarizes you with a few programming basics. Service number 02 takes these procedures a step further. Ser- vice number 02 is to software what Chapter 2 is to hardware.
	01	AREA CODE? 555 The area code of your rate chip. Upon power- up, this number is automatically reset. This number is used in callbacks and is displayed at power-up.
	02	EXCHANGE? 555 Your phone's three-digit exchange number. Alter this number to match your phone's exchange. This number is used in callbacks and is displayed at power-up.
	03	NUMBER? 5555 Enter your phone's four-digit station number. This number is used in callbacks and is displayed at power-up.
	04	MONTH DATE? 0101 Enter the month (e.g., January 1 is entered as 0101, or 101 and #). Entries must be at least three, but not more than four digits.
	05	YEAR? 1986 Enter the year (e.g., 1986).
	06	SMTWTFS DAY? 4 Set the day of the week. Enter Sunday as 1, Monday as 2, etc.
	CAUTION	A zero in this subroutine indicates a clock-set error. With the clock turned off, full rates apply all the time. With the clock shut down, discount calls will only operate at full price. Timed calls will always function properly. Setting the day of the week to 0 also shuts off the clock.

SERVICE NUMBER	CODE NUMBER	FEATURE OR APPLICATION
02 (cont'd)	07	HR:MN:SE? 162147 Set clock hours:minutes:seconds. Military time is used (e.g., quarter until eleven a.m. and ten seconds is 104510; midnight is 000000 and 11 p.m. is 230000).
	08	1+AREA REQUIRE?N Feature 08 is set by the rate chip. All 1+ dialing requires 10 digits.
	09	0+AREA REQUIRE?N For an operator-assisted call, do you have to dial an area code? You must set feature 09.
	10	OFF WHEN FULL? N If Y, when the cashbox is full, calls that cost anything are blocked (OUT OF SERVICE appears). Set by feature 35. Free calls can still be placed.
	11	PHONE OFF? N If yes, the phone is removed from service.
	12	BILINGUAL? N If no, only speaks English.
	13	ROTARY DIAL? N Choose DTMF (tone) or pulse dialing.
	NOTICE	PULSE dialing is used in all rotary and some pushbutton phones.
	14	"*" TO TALK? N If answer supervision isn't working in your area, use this option. Free calls don't require *.
	15	INCOMING CALLS? Y Do you want people to receive calls at your phone? If N (6 for no), phone won't ring.
	16	SERVICE CALLS? Y Do you want phone service to be performed from a remote location?
	17	COIN THEN DIAL?N If N, the prompt INSERT COINS appears after the user dials. If Y (9 for yes), when the handset is lifted, the phone displays INSERT COINS.

SERVICE NUMBER	CODE NUMBER	FEATURE OR APPLICATION
02 (cont'd)	18	DEMO MODE? N In <u>Demo Mode</u>, callbacks are audible at the phone and visible in its display. Also use Demo Mode to...(a) hear calls being dialed. (b) see remote access at the phone's display. (c) display of some diagnostic characters.
	19	AREA CODE NXX? N For expansion of the phone system.
	20	EXCHANGE NXX? Y Currently used exchange format. Only pertains to local calls. Set by the rate chip.
	21	MSG ON 0+? N Tells operator this is a pay telephone, not a billable number for outgoing calls. (Assumes COCOT line!)
	22	MSG ON ANSWER? N Issues message during incoming calls that this is a pay phone, not a billable number. (Incoming calls to people must also be enabled. Feature assumes COCOT line!)
	23	ESCRO $$cc? 900 Entry must be greater than 100, or function 23 is disabled. Monitors amount in escrow pocket. If the feature 23 amount is reached, the phone collects the money. Collected money can't be returned, but the call can be completed. If a call isn't completed, the money is gone and no credit is given.
	24	DAYLIGHT SAVE? Y Automatically adjusts the clock for daylight savings time. On the Last Sunday in April, the clock changes from 1:59:59 a.m. to 3:00:00 a.m. On the last Sunday in October, the clock changes from 1:59:59 to 1:00:00 a.m.
	CAUTION	Don't set the clock during the hour when the clock changes from 1:59 to 1:00. If you set the clock then, it will still set itself back an hour.

SERVICE NUMBER	CODE NUMBER	FEATURE OR APPLICATION
02 (cont'd)	25	12HR CLOCK? Y Select display of 12-hour a.m./p.m. time or 24-hour military time. (See the Hour Tables at service number 11 in Chapter 4. They include an a.m./p.m. to military time comparison.)
	NOTICE	Your phone displays a modified version of a.m./p.m. time. A properly-adjusted phone displays 12 p.m. at 12 midnight. Furthermore a properly-adjusted phone displays 12 a.m. at 12 noon. Standard military time is used.
	26	U5 BAD? N If EEROM U5 is bad, the display reads U5 BAD? Y. The phone makes this setting.
	27	CARD DIGITS? 14 The maximum number of digits credit cards have. A legitimate password with fewer than maximum will be accepted. To forbid credit-card calls, enter zero.
	NOTICE	<u>RATES</u>, mentioned in the discussion of features 28 through 31, refer to service number 06. See 06 in Chapter 4.
	28	CARD RATE? 128 What rate should be used for credit card calls? (Free by default.) The ringback (line quality) is always normal.
	29	LOCAL RATE? 129 What rate should be used for local calls? (Also for advertisements and for the "coin then dial" option.) Set by the rate chip.
	30	0 RATE? 128 What rate should be used for calls to the operator? (Free by default.) The ringback type is normal.
	31	0+ RATE? 128 What rate should be used for operator-assisted calls? The ringback type is normal.

SERVICE NUMBER	CODE NUMBER	FEATURE OR APPLICATION
02 (cont'd)	32	PBX DIGIT? 0 Entering 0# disables this feature. To use this feature, choose the code for an outside line (9 or 99). Enter the code (9# or 99).
	NOTICE	A zero cannot be the first digit. Beware of PBX's that produce non-standard busy signals. (A standard busy signal is a half second each of tone and silence.)
	33	ANS RINGS? 8 The number of rings allowed for answering the phone. If the phone isn't adjusted to accept incoming calls, the setting for this feature is two rings.
	34	80% FULL $? 100 The number of dollars that causes the phone to call for a collection.
	35	100% FULL $? 120 The number of dollars that causes the phone to display OUT OF SERVICE. This amount also causes the phone to call, announcing that its cashbox is full.
	36	OVERDRAFT SEC? 3 The number of extra seconds the phone gives the consumer for depositing additional coins.
	37	HANDSET HRS? 120 After several hours without phone calls, the phone reports bad hardware. This feature determines the number of hours before the report. To turn off this feature, enter 0
	38	ALT CARRIER #1? 0 Phone number of the desired alternate carrier (MCI, etc.). Unusual ringbacks (noisy lines) can be accomodated with service number 06, features 08 through 13. A normal ringback is the default setting.
	NOTICE	REQUIREMENTS FOR ALTERNATE-CARRIER CALLS: (1) 10-digit number caller wishes to dial. (2) Must be a non-operator call. (3) Rate table must correspond to the alternate carrier. (4) Alternate carrier's phone number is supplied. (5) Access code is supplied.
	39	ACCESS CODE #1? Security access code of alternate carrier #1.

SERVICE NUMBER	CODE NUMBER	FEATURE OR APPLICATION
02 (cont'd)	40	ALT CARRIER #2? Phone number of second alternate carrier.
	41	ACCESS CODE #2 0 Security access code of alternate carrier #2.
	NOTICE	SPEED-CALLING NUMBERS allow customers to key * plus one digit to reach any number. (The digits one through nine are used for this purpose.) You choose the speed-calling numbers. Enter any number with 18 digits or less. If less than 18 are needed, key #.
	42	*1? 0 First speed-calling number.
	43	*2? 0 Second speed-calling number. See 42.
	44	*3? 0 Third speed-calling number. See 42.
	45	*4? 0 Fourth speed-calling number. See 42.
	46	*5? 0 Fifth speed-calling number. See 42.
	47	*6? 0 Sixth speed-calling number. See 42.
	48	*7? 0 Seventh speed-calling number. See 42.
	49	*8? 0 Eighth speed-calling number. See 42.
	50	*9? 0 Ninth speed-calling number. See 42.
	51	211 NBR? 0 When 211 is keyed, what number should the phone dial (18 digits allowed)? Entering C, 0, or less than three digits disables 51.
	52	311 NBR? 0 See 51.
	53	411 NBR? 0 See 51.

SERVICE NUMBER	CODE NUMBER	FEATURE OR APPLICATION
02 (cont'd)	54	511 NBR? 0 See 51.
	55	611 NBR? 0 See 51.
	56	711 NBR? 0 See 51.
	57	811 NBR? 0 See 51.
	58	911 NBR? 0 See 51.
	59	MODEM GROUP? 0 Grouping number. (Remote computer use only.)
	60	WILTELCO 5000 Model number of phone.
	61	V5.00 Software revision number.
	62	CLOCK ADJ? 0 This four-digit number adjusts the clock every morning after midnight. The first two digits represent minutes and the second two represent seconds. If the minutes are 0 to 49, the clock is set ahead. To set the clock back, add 50 to the minutes. (For example, 5102 subtracts one minute, two seconds. 4910 adds 49 minutes, 10 seconds.)
	63	BAD DIAL TONE? N If your area has a non-standard dial tone, set this feature to Y (yes).
	64	COIN SOUND? N Do you want to hear a sound when you drop coins down the coin chute?
	65	1 + 7 OPTION? Y Key in Y (yes) in locations where you must dial 1 before the exchange and number.
	66	00/00+ OPTION? N If you key Y (9 for yes), customers can dial 00 for the AT&T operator.

SERVICE NUMBER	CODE NUMBER	FEATURE OR APPLICATION
03 Pass- words	CONCEPT	Passwords control access to programmable features and entry to the phone. There are five levels of passwords. Any password can have access to any combination of features. However, only the master password should permit you to customize passwords. When the PASSWORD #X prompt appears, either enter the line number you want to modify... Or repeatedly press the * key until you arrive at the desired line. Answer each question. To select and adjust a different password, press #.
	1 NOTICE	PASSWORD #1 (Modify password number 1?) Master Password: Can access all features. This is the only password that can't be locked out of modifications. At power-up, password-1 modifications and service entry are reset to Y (yes, permit- ted). Otherwise you might lock yourself out of the phone.
	2	PASSWORD #2 (Modify password number 2?) Modem Password: Typically, can access the bookkeeping, configuration, diagnostics and advertising features. At power-up, pass- word-2 modifications are reset to Y (yes, permitted). To disable remote entry through this password, set PASSWORD #2 to NO. This password doesn't permit remote diagnostics.
	3	PASSWORD #3 (Modify password number 3?) Accountant's Password: Typically, can access bookkeeping features.
	4	PASSWORD #4 (Modify password number 4?) Service Password: Typically allows users to open the top of the phone and adjust call-handling programs.
	5	PASSWORD #5 (Modify password number 5?) Collector Password: Typically, can only reset the cashbox total during a collection.

SERVICE NUMBER	CODE NUMBER	FEATURE OR APPLICATION	
03 (cont'd)	1-5	LINE	
		01	PASSWORD? (Password Number)
		02	VOICE ENTRY? Y Allow remote keypad entry? The remote site receives a voice prompt.
		CAUTION	REMOTE PROGRAMMING. In Demo Mode, the phone displays all actions. Furthermore the local keypad can override remote commands. See service number 02, feature 18.
		03	MODEM ENTRY? Y Refers to remote, service entry into the phone via modem.
		04	SERV ENTRY? Y Enable access to the top section of the phone? This is the section with electronics and mechanical parts. Keys are still necessary, but without 04 enabled, the phone reports a service-entry violation.
		05	COIN ENTRY? Y Allow entry into the lower section of the phone? Without 05 enabled, the phone reports a coin-entry violation.
		06	COIN MOD? Y Except bookkeeping, allow changes to coin service numbers (01)?
		07	CONFIG MOD? Y Should this password permit service configuration (02) changes?
		08	PASSWRD MOD? Y Should this password permit password (03) changes?
		CAUTION	Only a few passwords should allow password modification. Anyone with clearance to alter passwords can lock others out of the system.

SERVICE NUMBER	CODE NUMBER	FEATURE OR APPLICATION	
03 (cont'd)	1-5	LINE	
		09	DO DIAG? Y Should this password permit the running of diagnostics (04)?
		10	AD MOD? Y Should this password permit advertising (05) changes?
		11	PHONE # MOD? Y Allow rate changes (06) for a phone number, exchange, or area code?
		12	RATE MOD? Y Allow rate table (07) changes?
		13	LOOK AT BOOKS? Y Allow bookkeeping (08) changes?
		14	CALL BACK MOD? Y Should this password permit changes to the callback service numbers (09)?
		15	HOLI TBL MOD? Y Allow changes to the holiday service numbers (10)?
		16	HOUR TBL MOD? Y Allow changes to the hour table (11)?
		17	RESTORE MOD? Y Should this password permit factory settings to be restored (12)?

SERVICE NUMBER	CODE NUMBER	FEATURE OR APPLICATION
04 Diag- nostics	CONCEPT	Diagnostics consists of tests and diagnostic modes. While you run tests or modes, Diagnostics suspends the two-minute key-removal period. Also, Remote Diagnostics (calling this phone from another phone) cannot be performed. ALL TESTS CYCLE THROUGH STEPS. Halt a test on any step by hanging up the phone. Now you can advance the test one step by pressing 0 to 9. TO ENTER THE NEXT TEST, press *. To return to the diagnostic menu, press #.
	NOTICE	Phones with revision 2.0 firmware include all diagnostic features. Phones with revision 1.0 only include features 1 through 5.
	01	AUTO CYCLE Some memory-chip failures only appear after numerous checksum comparisons. Auto-Cycle Mode permits continuous memory tests. If an error is detected, Auto-Cycle Mode aborts and a failure message appears. To exit Auto-cycle Mode, hold down * or # until SHUTTING DOWN appears. (* KEY ERROR or # KEY ERROR might also appear, but ignore these messages.) Your phone will shut down and restart.
	CAUTION	Never remove power from the phone during Auto-Cycle Mode. Otherwise the CMOS RAM may lose your coin totals, total to date, and callback status. CMOS CKSUM ERROR implies failures of the CMOS RAM or its data.
	NOTICE	Errors produced in Auto-Cycle Mode aren't logged on the Bad Hardware Callback.
	02	SWITCH TEST? N Displays names of closed switches. (The switchhook closes when the phone is hung up. A key switch closes when its key is turned. Keypad switches close when you press them. Coin switches close when you insert coins.) Individually check each switch. To exit this test, hold down * or # for two seconds.

SERVICE NUMBER	CODE NUMBER	FEATURE OR APPLICATION
04 (cont'd)	03	ESCROW TEST? N Phone off hook: Escrow solenoid pulses, alternating between the "return" and "keep" directions. To pulse the solenoid only in the "return" direction: While the display says ESCROW KEEP, remove the phone and return it to the hook. Or with the phone hung up, press any number key To pulse the solenoid only in the "keep" direction: While the display says ESCROW RETURN, remove the phone and return it to the hook.
	04	DISPLAY TEST? N Use the switchhook to step through this test:

	STEP	
	A	Light all segments
	B	Blank display
	C	Light all dots in a row (bottom/top)
	D	Blank display
	E	Light each 5 x 7 matrix (left/right)
	F	Blank display
	G	Light all dots in a column (left/right)
	H	Blank display

SERVICE NUMBER	CODE NUMBER	FEATURE OR APPLICATION
	05	LIMITER TEST? N Turns the limiter circuit on and off. With the phone off the hook, the limiter cycles on and off. With the phone on the hook, any key 1 through 9 switches the limiter on and off.
	06	RINGER TEST? N Turns the buzzer (ringer) on and off. With the phone off the hook, the buzzer cycles on and off. With the phone on the hook, any key 1 through 9 switches the buzzer on and off.
	07	SPEECH TEST? N Cycles through sample speech. The switchhook has no effect on this routine.

SERVICE NUMBER	CODE NUMBER	FEATURE OR APPLICATION
04 (cont'd)	08	OPEN LOOP TEST?N This test routes the phone line to the earphone and microphone. WHEN THE PHONE IS ON THE HOOK, ringing voltages are tested. If the phone isn't ringing, ONHOOK NO RING appears. If a ring is detected, ONHOOK RINGING appears and the buzzer sounds. WHEN THE PHONE IS OFF THE HOOK, open loop current is tested. If the line is open, OFFHOOK OPEN LP appears. If there is current on the line, OFFHOOK CURRENT appears.
	NOTICE	Momentary indications of either open loop or ring signals are spurious. Ignore them.
	09	SETUP MODE #1? N This mode sets the Analog Mode and Tone Mode to a predetermined state. Then Setup Mode imitates Call Mode (See Call Mode).
	NOTICE	Before exiting feature 09, always hang up. If you don't, the phone will act as if its receiver is off hook. This situation will continue until you shut down the phone.
	NOTICE	To exit feature 09, use *.
	10	SETUP MODE #2? N This mode sets the Analog Mode and Tone Mode to a predetermined state. Then Setup Mode imitates Call Mode (See Call Mode).
	CAUTION	See the CAUTION and NOTICE at Feature 09.
	11	ANALOG MODE? N Is your phone adding noise to the incoming phone signal? Can your phone provide a DTMF tone to the earphone? These are just two of the questions you can answer with feature 11. FEATURE 11 PERMITS you to route many types of analog signals through phone circuitry. Input versus output signal comparisons and signal tracing are facilitated by feature 11. Simultaneous, multiple patches are possible. PREFERRED TEST SETUP. This test is most useful to technicians with oscilloscopes and

SERVICE NUMBER	CODE NUMBER	FEATURE OR APPLICATION
04 (cont'd)	11 (cont'd)	phone test beds. However, when routed to the earphone, some phone signals are audible. Using the earphone as a diagnostic tool, modestly-equipped shops may find feature 11 useful. ANALOG MULTIPLEXER (mux) U7 functions as an automatic plug board. Feature 11 allows you to temporarily rearrange the "plugs." CUSTOMIZE OTHER TESTS. The last input/output route choosen on this test sets mux U7 for subsequent tests. In fact feature 11 entries affect both tests 12 and 13. However they don't affect normal operation of the phone. L AND J. Chip U7 has eight input lines designated with the prefix L-. U7's four output lines have the prefix J-. TESTING THE LINES AND U7. Key an L (input) number and a J (output) number. For example, key 3 and then 1. Since this combination places a DTMF tone on the earphone, you should hear the tone. The first number you enter is always the L number. * To erase all combinations, key 8 or 9. * To erase a single combination, type the L number. Then add four to the J number and type the sum. * Suppose you type a wrong L number but have not typed the J number. To cancel the L number, press 8 or 9. DOCUMENT YOUR EXPERIMENT. Use a copy of this table to document your test connections. Represent a "patch" by drawing a line between the input and output you've connected.

INPUTS (L-)	OUTPUTS (J-)
L0: speech 2 L1: speech 1 L2: mic 2 L3: DTMF 3 L4: DTMF 2 L5: DTMF 1 L6: phone line 2 L7: phone line 1	J0: DTMF J1: earphone J2: to PIA J3: phone line

SERVICE NUMBER	CODE NUMBER	FEATURE OR APPLICATION
04 (cont'd)	12	TONE MODE? N *To turn on one of eight DTMF (dual tone, multifrequency) tones, press 1 through 8. *Pressing "0" or "9" turns off the single tone. *In the Phone Call Diagnostic, pressing 0 through 9 enables normal dual tones. *The last setting of <u>Analog Mode</u> affects <u>Tone Mode</u>. However the DTMF circuit that normally couples to the earphone is temporarily routed there. (This is DTMF 3.) *The effects of <u>Analog Mode</u> connections are remotely audible.
	13	CALL MODE? N Use # to toggle between two modes... <u>CALL MODE.</u> The switchhook and keypad allow you make a call without answer supervision. Your earphone and microphone are connected to the phone line. You can talk to anyone. <u>TEST MODE.</u> The analog mux is programmed according to the <u>Analog Mode</u> (Feature 04 11). In <u>Analog Mode</u>, a single tone was selected for the DTMF chip. If no tone (0Hz) was selected, press 0 through 9 to select normal DTMF tones.
	NOTICE	Before exiting feature 13, hang up. If you don't, the phone may act as if its receiver is off hook. This situation will continue until you shut down the phone. <u>EXCEPTION.</u> To alter feature 11 or 12 settings without hanging up, exit feature 13. Make your change, then return to <u>Call Mode</u> with the phone off hook. To use your new settings, key #.
	NOTICE	To exit feature 13, use *.

SERVICE NUMBER	CODE NUMBER	FEATURE OR APPLICATION
05 Adver- tising	CONCEPT	<u>DISPLAY YOUR PROMOTIONAL MESSAGE!</u> Including spaces and punctuation, your advertisement can run up to 512 characters. <u>MESSAGES CONSIST OF</u> printable characters. Messages longer than 16 printable characters scroll from left to right across the display. With messages over 16 characters, no special effects are possible. <u>START YOUR MESSAGE</u> at the beginning of the advertising section or after another message. Use the ASCII table to convert each letter of your message to a number. Enter your message one character at a time. <u>USE DISPLAY CODE.</u> Messages under 132 charac- ters must be followed by a display code. These codes are described below. <u>END CODE.</u> Follow the display code of your last message with an end code (031).
	000	Space: Never displayed (not printable).
	001	Centers the message and displays it for one second. If there's no message, blanks the display for one second. Other display codes consist of 001 plus a special effect.
	002	Displays your message for another second.
	003	Scrolls the message up into the display. (To see the message, add a few 002 codes after the 003.) If there's no message, 003 scrolls the previous message up and off the display.
	004	Scrolls the message down into the display. (To see the message, add a few 002 codes after the 004.) If there's no message, 004 scrolls the previous message up and off the display.
	005	Quickly flashes your message five times. If there's no message, 005 flashes your previous message five times.
	006	Slowly flashes your message twice. If there's no message, 006 slowly flashes your previous message twice.

SERVICE NUMBER	CODE NUMBER	FEATURE OR APPLICATION
05 (cont'd)	007	Left justifies your message. (To see the message, add a few 002 codes after the 007.) If there's no message, the display blanks for one second.
	008	Right justifies your message. (To see the message, add a few 002 codes after the 008.) If there's no message, the display blanks for one second.
	009	From the right, 009 quickly scrolls your message onto the display. (To see this message, add a few 002 codes after the 009.) If there's no message, 009 quickly scrolls the previous message off to the left.
	010	From the left, 010 quickly scrolls your message onto the display. (To see this message, add a few 002 codes after the 010.) If there's no message, 010 quickly scrolls the previous message off to the right.
	NOTICE	<u>FEATURES 11 THROUGH 18</u> aren't display modes. For this reason we discuss them in a separate section of this service-number table.
	019	Jumps to the ad of your choice. Use this feature to skip or repeat messages. After you enter 019, you make two more entries. These specify the location where your next message begins. The entry after 019 sets the hundreds digit. The last entry sets the tens and ones digits. <u>EXAMPLES</u>: 019,001,023 jumps display to location 123. 019,000,001 jumps display to location 001. Incidentally jumping backward to 001 creates a continuous loop. With a continuous loop, the time and date are never displayed.

SERVICE NUMBER	CODE NUMBER	FEATURE OR APPLICATION
05 (cont'd)	020	Shows the previous message for an adjustable period of zero to four seconds. A separate entry sets how many 1/64ths of a second that the message should remain. EXAMPLES: 020,064 displays your message for one second (similar to code 002). 020,032 displays your message for 32/64 or one-half second.
	021	Blanks the display. (To see a blank display, add a few 002 codes after the 021.)
	022	Displays your message as if it were behind opening curtains. (To see this message, add a few 002 codes after the 022.) If you enter 022 after your last message, a different effect occurs. As if it were written on opening curtains, the old message disappears.
	023	Displays your message as if it were written on closing curtains. (To see this message, add a few 002 codes after the 023.) If you enter 023 after your last message, a different effect occurs. As if it were behind closing curtains, the old message disappears.
	031	Denotes the end of your last message.

ASCII Table

CHARACTER	NUMBER	CHARACTER	NUMBER
(SPACE)	032	@	064
!	033	A	065
"	034	B	066
#	035	C	067
$	036	D	068
%	037	E	069
&	038	F	070
'	039	G	071
(	040	H	072
)	041	I	073
*	042	J	074
+	043	K	075
,	044	L	076
-	045	M	077
.	046	N	078
/	047	O	079
0	048	P	080
1	049	Q	081
2	050	R	082
3	051	S	083
4	052	T	084
5	053	U	085
6	054	V	086
7	055	W	087
8	056	X	088
9	057	Y	089
:	058	Z	090
;	059	[	091
<	060	¢	092
=	061	]	093
>	062	↑	094
?	063	~	095

SERVICE NUMBER	CODE NUMBER	FEATURE OR APPLICATION
05 (cont'd)	011-018	**DESIGN YOUR OWN CHARACTERS.** Graphic characters can be any shape. Four different graphic characters (011 through 014) may appear in a message. However between messages, you can redefine their shapes. **DEFINING A CHARACTER.** A character has five columns. These columns are numbered from left to right. Each column is seven pixels (dots) high. Within any column you select the turned-on pixels. Practice with the example below. The graphic character is a bell. Here is the entry procedure... [ ] A. Enter Service Number 05. [ ] B. Select an ad location. (If the graphic character begins your first message, press *.) [ ] C. To define graphic symbol 1, key 011*. (Each symbol has its own number.) [ ] D. Add the column-1 numbers: Enter 032*. [ ] E. Add the column-1 numbers: Enter 060*. [ ] F. Add the column-3 numbers: Enter 127*. [ ] G. Add the column-4 numbers: Enter 060*. [ ] H. Add the column-5 numbers: Enter 032*. [ ] I. To use graphic symbol 1, key 015*. (Each symbol has its own number.) [ ] J. For a one-second display, key 001*. [ ] K. For an additional second of display time, key 002*. [ ] L. Key 031. [ ] M. Reset the phone by turning the access key. Watch for the bell display.

SERVICE NUMBER	CODE NUMBER	FEATURE OR APPLICATION
05 (cont'd)		**Creating a Graphic Character**

COLUMN

1	2	3	4	5
***	***	001	***	***
***	***	002	***	***
***	004	004	004	***
***	008	008	008	***
***	016	016	016	***
032	032	032	032	032
***	***	064	***	***

DISPLAY A BELL!

```
Character #..........011
Column 1 =...........032
Col 2 = 4+8+16+32=....060
Col 3 = 1+2+4+8+16+32=127
Col 4 = 4+8+16+32=....060
Column 5 =...........032
Use character 011.....015
```

	CODE NUMBER	FEATURE OR APPLICATION
	011	Define graphic character #1. (See the explanation above.)
	015	Use graphic character #1. (See the explanation above.)
	012	Define graphic character #2. (See the explanation above.)
	016	Use graphic character #2. (See the explanation above.)
	013	Define graphic character #3. (See the explanation above.)
	017	Use graphic character #3. (See the explanation above.)
	014	Define graphic character #4. (See the explanation above.)
	018	Use graphic character #4. (See the explanation above.)

Chapter 4:
Advanced Programming

About This Chapter
Service Number Definitions
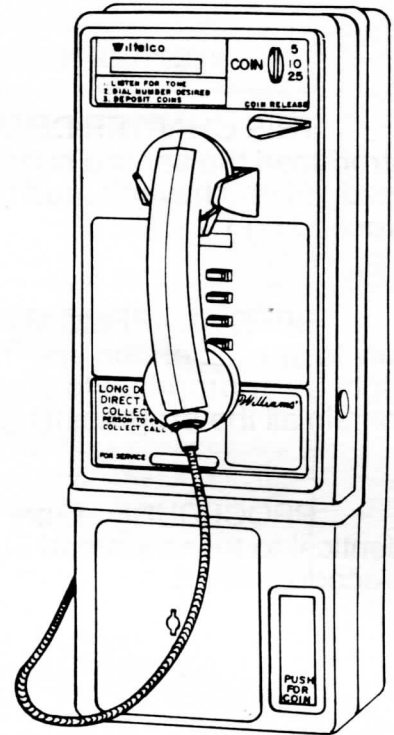
About This Chapter

THIS CHAPTER DETAILS the last seven of the 12 service numbers. Chapter 3 introduced the service numbers. It detailed the first five, which are most frequently used. (If you haven't read the introductory pages of Chapter 3, please do so before proceeding.)

SPECIAL APPLICATIONS. Some of the service numbers in this section apply only to special phone applications. Examine the topics covered here to see if they might be appropriate to your phone application. For the time being, Chapter 3 may contain all the programming procedures you need.

PROCEDURE. Entry procedures for this chapter's service numbers are identical to those learned in Chapter 3. For your convenience we repeat the procedure chart.

How to Access the 12 Service Numbers

STEP	ACTION	OPTIONS	PHONE RESPONSE
1	Access phone's service section	[ ] On-site, with key [ ] Remotely, by dialing phone's number [ ] Remotely, by computer	Displays PASSWORD:
2	Enter password	[ ] Six-character password (no alternative)	Displays WHICH SERVICE? Says "dial service number."
3	Enter category number of desired service	[ ] 01: Cashbox [ ] 02: Configuration [ ] 03: Passwords [ ] 04: Diagnostics [ ] 05: Advertising [ ] 06: Phone Number Mode [ ] 07: Rate Tables [ ] 08: Bookkeeping [ ] 09: Callbacks [ ] 10: Holiday Tables [ ] 11: Hour Tables [ ] 12: Restore or Clear Settings	Displays first category feature and the setting for that feature. Says "service X. Dial code number." (The service's number is substituted for X.)
4	Enter a new setting for a category feature	[ ] 9 for yes [ ] 6 for no [ ] numbers as keyed [ ] * to enter setting and advance to next feature [ ] # to select a new category	Displays and says the feature and setting numbers.
5	Exit service section	[ ] Turn key [ ] Hang up [ ] Execute hangup routine on modem	Phone shuts down, runs diagnostic routine, and after initialization, incorporates changes.

Service Number Definitions

SERVICE NUMBER	CODE NUMBER	FEATURE OR APPLICATION
06 Phone Mode	WARNING	Study this section very carefully. Overcharging the consumer is illegal. You must comply with local tariffs.
	CONCEPT	WHICH PHONE MODE Use 06 to check the rate assigned to an area code, exchange, or station. You can also assign a new rate or delete a number. FIND RATE?N Key 6 for N or 9 for Y. If Y (yes), the phone enters its rate-search feature (01). If N (no), press * to enter the rate-assignment feature (02). To survey features 02 through 25, repeatedly key *.
	01	RATE, RING=0,0? Rate search for what phone number? Every phone number is given a rate table assignment and a ringback type assignment. Enter a three, seven, or ten-digit phone number.
	NOTICE	<u>A RINGBACK</u> is the sound the local phone detects while the remote phone is ringing.

<p align="center">Summary of Rate Tables</p>

RATE	DESCRIPTION
0	Invalid rate
1-???	Federal, interlata, intralata, local rates
???-127	Marked invalid, and not used by the factory. You may use them.
128	Free calls
129	Three minutes, 25 cents; one minute, five cents.
130-144	Unused by the factory; available for your use.
>144	Phone employs rate chip to calculate rate.

SERVICE NUMBER	CODE NUMBER	FEATURE OR APPLICATION
06 (cont'd)	Enter Phone Number and Assign Rate	
	02	3 DIGIT ENTER? 0 Enter the three-digit phone number you wish to assign a rate to (for example, 911 or 411). This number must be three digits! Don't use #. After you enter the number, the display prompts, RATE TBL NBR? 0. RATE TBL NBR? 0 Key in the desired rate figure for the number just entered. (See the Rate Table Summary above.) After you complete this line, the previous prompt reappears. Now you can enter and rate another number. To exit 02, press #.
	03	PHONE # ENTER? 0 Enter AAA-XXX-SSSS. AAA is the area code, XXX is the exchange number, and SSSS is the station number. After you enter the 10-digit number, the display prompts, RATE TBL NBR? 0. RATE TBL NBR? 0 (See RATE TBL NBR? 0 at 02 above.)
	04	E+S ENTER? 0 Enter ???-XXX-SSSS Use 04 to assign a rate to a local call (Exchange and station numbers only). RATE TBL NBR? 0 (See RATE TBL NBR? 0 at 02 above.)
	05	EEE ENTER? 0 Enter ???-XXX-???? Use 05 to assign a rate to the numbers in one exchange. RATE TBL NBR? 0 (See RATE TBL NBR? 0 at 02 above.)

SERVICE NUMBER	CODE NUMBER	FEATURE OR APPLICATION
06 (cont'd)	06	AAA + EEE ENTER? 0 Enter AAA-XXX-???? Use 06 to assign a rate to numbers in one area code and exchange. RATE TBL NBR? 0 (See RATE TBL NBR? 0 at 02 above.)
	07	AAA ENTER? 0 Enter AAA-???-???? Use 06 to assign a rate to all the numbers in one area code. RATE TBL NBR? 0 (See RATE TBL NBR? 0 at 02 above.)
	Enter Phone Number and Assign Ringback Type 08	 RING 3D? 0 See the table Ringback Types above. A three-digit number (911, etc.) may have a peculiar ringback. The phone shouldn't confuse this ringback with an answer. Enter three-digit numbers with unusual rings at 08. RING TYPE? 0 See the discussion of ringback types below. Compensate for a peculiar ringback: Key in the desired ringback type for the number just entered.

SERVICE NUMBER	CODE NUMBER	FEATURE OR APPLICATION
06 (cont'd)	08 (cont'd)	HOW TO SPECIFY RINGBACKS. Use variables X, Y and Z to create a three-digit ringback type (XYZ). The options for each variable are described in the tables below. One example of a ringback type is 125. The digit one (X) means "operator intervention." The two (Y) means that two "answers" (noises, that is, ringbacks) are ignored. If you have a noisy line, this number helps to distinguish line line noises from answers. The five (Z) means that the call is placed as an immediate telephone-company call.

X Table

X EQUALS	DESCRIPTION
0	No operator intervention
1	Operator intervention

Y Table

Y EQUALS	DESCRIPTION
0 to 9	The Y digit specifies how many "answers" (noises) the phone ignores. Experience determines the optimum number.

Z Table

Z EQUALS	DESCRIPTION
0 or 1	Normal answer supervision
2	T-bar answer supervision
3	To talk, push *
4	Immediate answer (for free phone calls or emergency numbers)
5	Immediate telco call

SERVICE NUMBER	CODE NUMBER	FEATURE OR APPLICATION
06 (cont'd)	08 (cont'd) NOTICE	OPERATOR INTERVENTION. Suppose that the X variable is set to 1. When the operator answers, the phone says "operator, this is a non-billable phone number."
	09	RING # ENTER? 0 See the discussion of ringback types above. A ten-digit number may have a peculiar ringback. The phone shouldn't confuse this ringback with an answer. Enter ten-digit numbers (AAA-XXX-SSSS) with unusual rings at 08. RING TYPE? 0 (See RING TYPE? 0 at 08 above.)
	10	RING E + S ENTER? 0 For local (seven-digit) calls. Otherwise similar to 08. Enter ???-XXX-SSSS. RING TYPE? 0 (See RING TYPE? 0 at 08 above.)
	11	RING EEE ENTER? 0 Use this feature when an entire exchange has a peculiar ringback. Similar to 08. Enter ???-XXX-????. RING TYPE? 0 (See RING TYPE? 0 at 08 above.)
	12	RING A+E ENTER? 0 Use this feature when one exchange in an area code has a peculiar ringback. Similar to 08. Enter AAA-XXX-????. RING TYPE? 0 (See RING TYPE? 0 at 08 above.)
	13	RING AAA ENTER? 0 Use this feature when the numbers in one area code have a peculiar ringback. Similar to 08. Enter AAA-???-????. RING TYPE? 0 (See RING TYPE? 0 at 08 above.)

SERVICE NUMBER	CODE NUMBER	FEATURE OR APPLICATION
06 (cont'd)	Delete Phone Numbers	
	14	**3 DIGIT DELETE** The display provides the phone number and its rate number. For example, XXX 911,128? N. To delete the number, press Y (9 for yes). Then the next number appears.
	NOTICE	To inspect the next number without deleting anything, press *.
	NOTICE	DELETE VS. REMOVE. The "delete" feature (14 through 25) shows you the phone numbers one by one. You inspect the numbers and choose one to delete. The "remove" feature (26 through 37) is faster. But it requires that you know the information you plan to remove. You key in the feature and then enter the feature to be removed.
	15	**PHONE # DELETE** Delete a phone number by finding it here and answering Y. The display provides the 10-digit phone number and its rate number. For example, 1112345678,5?N. (See 14.)
	16	**E + S DELETE** Use this feature to delete a combination of exchange and station numbers (seven digits). Similar to 14. To delete, key Y.
	17	**EEE DELETE** Use this feature to delete an exchange number. Similar to 14. To delete, key Y.
	18	**A + E DELETE** Use this feature to delete a combination of area code and exchange numbers. Similar to 14. To delete, key Y.
	19	**AAA DELETE** Use this feature to delete an area code number. Similar to 14. To delete, key Y.
	20	**RING 3D DELETE** Use this feature to delete the ringback type assigned to a three-digit number. Similar to 14. To delete, key Y.

SERVICE NUMBER	CODE NUMBER	FEATURE OR APPLICATION
06 (cont'd)	21	RING # DELETE Delete the ringback type assigned to a 10-digit phone number. Similar to 14. To delete, key Y.
	22	RING E + S DEL Delete the ringback type assigned to a combination of exchange and station numbers. Similar to 14. To delete, key Y.
	23	RING EEE DEL Delete the ringback type assigned to an exchange. Similar to 14. To delete, key Y.
	24	RING A + E DEL Delete the ringback type assigned to a combination of area code and exchange numbers. Similar to 14. To delete, key Y.
	25	RING AAA DEL Delete the ringback type assigned to an area code. Similar to 14. To delete, key Y.
	Remove Phone Numbers	
	26	3 DIGIT REMOVE Key in the phone number. For example, 911. To remove more numbers at this feature, press #. Advance to the next feature by pressing *.
	NOTICE	DELETE VS. REMOVE. The "delete" feature (14 through 25) shows you the phone numbers one by one. You inspect the numbers and choose one to delete. The "remove" feature (26 through 37) is faster. But it requires that you know the information you plan to remove. You key in the feature and then enter the feature to be removed.
	27	PHONE # REMOVE Key in the phone number. For example, 1112345678. To remove more numbers at this feature, press #. Advance to the next feature by pressing *.

SERVICE NUMBER	CODE NUMBER	FEATURE OR APPLICATION
06 (cont'd)	28	**E + S REMOVE** Use this feature to remove a combination of exchange and station numbers (seven digits). Similar to 26. To remove, enter the number.
	29	**EEE REMOVE** Use this feature to remove an exchange number. Similar to 26. To remove, enter the number.
	30	**A + E REMOVE** Use this feature to remove a combination of area code and exchange numbers. Similar to 26. To remove, enter the number.
	31	**AAA REMOVE** Use this feature to remove an area code number. Similar to 26. To remove, enter the number.
	32	**RING 3D REMOVE** Use this feature to remove the ringback type assigned to a three-digit number. Similar to 26. To remove, enter the number.
	33.	**RING # REMOVE** Remove the ringback type assigned to a 10-digit phone number. Similar to 26. To remove, enter the number.
	34	**RING E + S REM** Remove the ringback type assigned to a combination of exchange and station numbers. Similar to 26. To remove, enter the number.
	35	**RING EEE REM** Remove the ringback type assigned to an exchange. Similar to 26. To remove, enter the number.
	36	**RING A + E REM** Remove the ringback type assigned to a combination of area code and exchange numbers. Similar to 26. To remove, enter the number.
	37	**RING AAA REM** Remove the ringback type assigned to an area code. Similar to 26. To remove, enter the number.

SERVICE NUMBER	CODE NUMBER	FEATURE OR APPLICATION
07 Rate Tables	CONCEPT	There are 144 rate tables. The first 129 (001 through 129) are set by the factory. When the rate chip is released, factory settings include all known tariffs. The last 15 entries are blank. Program these for exchanges and area codes added after the rate chip's release. Every rate table has 20 features which are described below.
	01	INVALID? Y [ ] Enter the three-digit number of a rate table. [ ] Key *. The INVALID? Y prompt appears. [ ] To invalidate a rate, let the Y remain (9 for yes). Calls using an invalid rate won't be completed. [ ] To use a rate table, enter N (6 for no). [ ] To examine a rate table, press *.
	02	1 + 7 REQ? N 02 is for locations where phone users must dial 1 before exchange and station numbers. Enable 02 at feature 65 of service number 02.

	03	ALT CARRIER #? 0
		Before proceeding, see service number 02, feature 38 (ALT CARRIER #1? 0) in Chapter 3.
		
		In feature 03, you have three options. Enter one of these numbers...
		   0= Phone won't use alternate carriers.
		   1= Phone attempts to use alternate 1.
		   2= Phone attempts to use alternate 2.
		
		Generally local calls, invalid calls and free calls don't use an alternate carrier. Set 03 to zero. For other calls (intralata, interlata, long distance), use alternate carrier number 1.

	NOTICE	A LATA is a system of exchanges in one geographic area. AN INTRALATA CALL is usually placed and received on the same phone company's system. AN INTERLATA CALL is placed and received on different companies' systems. A LONG DISTANCE CALL is made and received in different states. Sometimes (but not always) it involves two phone companies' systems.

SERVICE NUMBER	CODE NUMBER	FEATURE OR APPLICATION
07 (cont'd)	04	LOCAL CALL? Are calls using this rate local? Imagine that you're considering a particular rate used for local calls. You answer Y (9 for yes) on feature 04. Your answer brings the bookkeeping service number (08) into play. Whenever this rate is used, a local call is logged at the bookkeeping service number.
	05	INTRALATA? Is this rate used for intralata calls? Imagine that you're considering rate XYZ, which is used for intralata calls. You answer Y (9 for yes) on feature 05. Your answer brings the bookkeeping service number (08) into play. Whenever this rate is used, an intralata call is logged at the bookkeeping service number.
	06	INTERLATA? Is this rate used for interlata calls? Imagine that you're considering rate XYZ, which is used for interlata calls. You answer Y (9 for yes) on feature 06. Your answer brings the bookkeeping service number (08) into play. Whenever rate XYZ is used, an interlata call is logged at the bookkeeping service number.
	07	LONG DIST? N Is this rate used for long distance calls? Imagine that you're considering rate XYZ, which is used for long distance calls. You answer Y (9 for yes) on feature 07. Your answer brings the bookkeeping service number (08) into play. Whenever rate XYZ is used, a long distance call is logged at the bookkeeping service number.
	08	AMENDABLE? N If Y (9 for yes), then during a call, 08 permits a rate change.

SERVICE NUMBER	CODE NUMBER	FEATURE OR APPLICATION
07 (cont'd)	09	HOLI TABLE? 0 Which holiday table should the phone use? (See service number 10.) Your options follow... | OPTION	MEANING
---	---
0	No additional tables are used.
1-9	Phone finds additional holidays on the specified table (1 through 9).	
	10	HOUR TABLE? 0 Which hour table should the pay phone use? Your options follow... | OPTION	MEANING
---	---
0	Calls are never discounted.
1-9	Calls are discounted according to the specified hour table (1 through 9). The table sets which discount applies for what hour of the week (FULL, DISC1, DISC2 or DISC3).	
	Initial Cost of the Call	
	11	I FULL $¢¢? 0 Discount price number 0. For a given rate table, this feature sets the full-price cost of calls. This price applies to a caller's initial deposit. See the Call Cost Table below.
	12	I DISC1. $¢¢? 0 Discount price number 1. For a given rate table, this feature sets the first discount price for calls. This price applies to a caller's initial deposit. See the Call Cost Table below.
	13	I DISC2. $¢¢? 0 Discount price number 2. For a given rate table, this feature sets the second discount price for calls. This price applies to a caller's initial deposit. See the Call Cost Table below.

Call Cost Table

Initial Cost (I DISC)	Time (IMMSS)	Add'l Cost (A DISC)	Add'l Time (A MMSS)	CALL TYPE
0	0	????	????	Typical free call. This is the only call type that doesn't use answer supervision.
0	30	0	0	Free call after a flat time. After 30 seconds, phone hangs up.
0	30	0	20	These settings produce a free call with answer supervision. The call is initially timed for 30 seconds, then every 20 seconds.
0	30	5	0	30 seconds free, then a non-amendable, flat rate of five cents.
0	30	5	20	30 seconds free, then five cents every 20 seconds.
10	0	???	???	Typical flat-rate call. 10 cents.
10	30	0	0	10 cents for 30 seconds, then the phone hangs up.
10	30	0	20	10 cents for 30 seconds. Additional 20-second periods are timed but free.
10	30	5	0	10 cents for 30 seconds, then a non-amendable, flat rate of five cents.
10	30	5	20	10 cents for 30 seconds, then five cents every 20 minutes (normal, timed call).

NOTICE

* COST means the final cost of a call. This amount results after consideration of hour and holiday tables.

* COST AND TIME FIGURES can be zero, non-zero or anything (????). Non-zero numbers are used as examples in the table above.

* AMENDABLE CALLS can change in cost or type. Assume that a call is established as a free call or flat-rate call. The phone doesn't check to see if the call changes type.

SERVICE NUMBER	CODE NUMBER	FEATURE OR APPLICATION
07 (cont'd)	14	I DISC3 $¢¢? 0 Discount price number 3. For a given rate table, this feature sets the third discount price for calls. This price applies to a caller's initial deposit. See the Call Cost Table above.
	15	I MMSS? 0 15 determines the amount of time consumers buy with their initial deposit. See the Call Cost Table above.
	Additional Cost of the Call 16	A FULL $¢¢? 0 Discount price number 0. For a given rate table, this feature sets the full-price cost of additional time. See the Call Cost Table above.
	17	A DISC1 $¢¢? 0 Discount price number 1. For a given rate table, this feature sets the first discount price for additional time. See the Call Cost Table above.
	18	A DISC2 $¢¢? 0 Discount price number 2. For a given rate table, this feature sets the second discount price for additional time. See the Call Cost Table above.
	19	A DISC3 $¢¢? 0 Discount price number 3. For a given rate table, this feature sets the third discount price for additional time. See the Call Cost Table above.
	20	A MMSS? 0 20 determines the amount of time consumers buy with an additional deposit. See the Call Cost Table above.

SERVICE NUMBER	CODE NUMBER	FEATURE OR APPLICATION	
08 Book-keeping	CONCEPT	The bookkeeping service number tells you a lot about your callers. How many long distance calls did they make? How many additional coins did they deposit? How many operator-assisted calls did they make? <u>These facts help you tailor your phone to your callers.</u> That means more value for them...and more profits for you! <u>AUDIT PROCEDURE.</u> To examine all bookkeeping totals, repeatedly press *. To choose a particular total, enter its code number at the WHICH BOOK prompt. <u>CLEARING BOOKKEEPING TOTALS.</u> Your collection agent clears features 02 through 13 by using his vault key. These features will also be cleared any time the phone is powered down and up again. Feature 01 isn't cleared by powering down and up. Its settings are stored in battery-backed CMOS RAM.	

	CODE NUMBER	DISPLAY	MEANING
	01	$-DATE $0.00	Total dollars collected
	02	TOTAL $0.00 @ 0	Total calls
	03	LOCAL $0.00 @ 0	Dollars per number of local calls
	04	INTRALATA $0.00 @ 0	Dollars per number of intralata, instate calls
	05	INTERLATA $0.00 @ 0	Dollars per number of interlata, instate calls
	06	LONG $0.00 @ 0	Dollars per number of long distance calls
	07	OPER $0.00 @ 0	Dollars per number of operator calls
	08	0 + $0.00 @ 0	Dollars per number of operator-assisted calls
	09	CREDIT $0.00 @ 0	Dollars per number of credit-card calls

SERVICE NUMBER	CODE NUMBER	DISPLAY	MEANING
08 (cont'd)	10	FREE $0.00 @ 0	Dollar value of free phone calls (not including credit card calls)
	11	555 $0.00 @ 0	Dollars per number of calls to directory-assistance numbers 411 or AAA-555-1212.
	12	800 $0.00 @ 0	Dollars per number of calls to 800 area codes
	13	911 $0.00 @ 0	Dollars per number of 911 (three-digit) calls
	14	00/00/00 00:00	Date and time when phone was last powered up. At that time, features 2 through 13 began their bookkeeping.

SERVICE NUMBER	CODE NUMBER	FEATURE OR APPLICATION
09 Service Callback Options	CONCEPT	**REPORTS ITS CONDITION.** A callback is your pay phone's report on situations that require your attention. <u>The phone actually dials your office and gives you a report</u>. Technical callbacks can be routed to one number and accounting callbacks to another. **GROUPS OF THREE.** Service number 09 is arranged in 12 groups of three features. Each group deals with one subject... * The first feature in a group (displayed NBR) asks you to enter a phone number. The pay phone calls this number with messages about the group's subject. * The second (VOICE) asks if you want a spoken callback. * The third (CLR'D) asks if you want to clear callbacks on the group's subject. It also provides the time and date of the latest situation that required a callback. Julian dates are used. CLR'D may be replaced by other words...

SITUATION	DISPLAYED WORD
Phone is calling back	CALL
Phone has called back	LAST
Callbacks were cleared	CLR'D

CLEARING CALLBACKS. You must "acknowledge" (clear) callbacks. There are three techniques for acknowledgment:

(A) During the callback, dial the area code and exchange of the phone that calls you. (A callback states the phone's number twice.)

(B) After the callback, call the phone. Key service number 12 and feature 07. Key Y and hang up.

(C) After the callback, call the pay phone. Key service number 09. Now clear the features that produced the callback. Keying Y (9 for yes) at a CLR'D feature erases its error code. Hang up.

SERVICE NUMBER	CODE NUMBER	FEATURE OR APPLICATION
09 (cont'd)	NOTICE	After acknowledgment, your pay phone won't call again unless something new develops. DEMO MODE permits the pay phone to display callback information. In Demo Mode you can also listen in at the pay phone. See service number 02, feature 18 in Chapter 3.
	NOTICE	THE TERM VIOLATION means attempted entry into an area of the phone without password authorization.
	01	SER IN NBR? 0 Should the pay phone call when your employee begins to service it? If so, enter the number the phone should call. If not, clear the number by setting it to zero.
	02	SER IN VOICE? Y If Y (9 for yes), when phone servicing begins, you receive a spoken report. If you're using a modem, enter N (6 for no).
	03	SER IN CLR'D? N This feature reports the day and time of the last service entry. The example LAST 156 12:33? N cites day 156 of operation at 12:33. Clearing feature 03 prevents further call-backs about this service entry. Here's the clearing procedure... [ ] 1. Call the pay phone. [ ] 2. Enter the appropriate password. [ ] 3. Enter service number 09. [ ] 4. Enter code number 03. [ ] 5. Key Y (9 for yes). [ ] 6. Key ### and hang up. The remote pay phone will clear the callbacks and reset.
	04	SER VIO NBR? 0 Should the pay phone call when someone attempts unauthorized entry into the phone? If so, enter the number the phone should call. If not, clear the number by setting it to zero.
	05	SER VIO VOICE? Y If Y (9 for yes), when a service violation occurs, you receive a spoken report. If you're using a modem, enter N (6 for no).

SERVICE NUMBER	CODE NUMBER	FEATURE OR APPLICATION
09 (cont'd)	06	SER VIO CLR'D? N This feature reports the day and time of the last violation. The example LAST 156 12:33? N cites day 156 of operation at 12:33. The clearing procedure is the same as that for feature 03.
	07	SER OUT NBR? 0 Should the pay phone perform a callback when the phone is restored to operation? If so, enter the number the phone should call. If not, clear the number by setting it to zero.
	08	SER OUT VOICE? Y If Y, when the phone is restored to operation, you receive a spoken report. Y means yes (key 9). If you're using a modem, enter N (6 for no).
	09	SER OUT CLR'D? N This feature reports the day and time when the phone was last restored to operation. The example LAST 156 12:33? N cites day 156 of operation at 12:33. The clearing procedure is the same as that for feature 03.
	10	$$$ IN NBR? 0 Should the pay phone call to report a cashbox entry (collection)? If so, enter the number the phone should call. If not, clear the number by setting it to zero.
	11	$$$ IN VOICE? Y If Y (9 for yes), when coins are collected, you receive a spoken report. If you're using a modem, enter N (6 for no).
	12	$ IN CLR'D? N This feature reports the day and time when the cashbox was last entered. The example LAST 156 12:33? N cites day 156 of operation at 12:33. The clearing procedure is the same as that for feature 03.
	13	$$$ VIO NBR? 0 Should the pay phone call to report an attempt to enter the cashbox? If so, enter the number the phone should call. If not, clear the number by setting it to zero.

SERVICE NUMBER	CODE NUMBER	FEATURE OR APPLICATION
09 (cont'd)	14	$$$ VIO VOICE? Y If Y (9 for yes), when a cashbox violation occurs, you receive a spoken report. If you're using a modem, enter N (6 for no).
	15	$$$ VIO CLR'D? N This feature reports the day and time when cashbox entry was last attempted without authorization. The example LAST 156 12:33? N cites day 156 of operation at 12:33. The clearing procedure is the same as that for feature 03.
	16	$$$ OUT NBR? 0 Should the pay phone perform a callback upon vault closure (after a collection?) If so, enter the number the phone should call. If not, clear the number by setting it to zero.
	17	$$$ OUT VOICE? Y If Y (9 for yes), upon vault closure you receive a spoken report. If you're using a modem, enter N (6 for no).
	18	$$$ OUT CLR'D? N This feature reports the day and time when the coinbox was last exited (collection completed). The example LAST 156 12:33? N cites day 156 of operation at 12:33. The clearing procedure is the same as that for feature 03.
	NOTICE	The term MOD appears in displays for features 19 through 27. It stands for "modification." Software modifications, whether made locally or remotely (including by modem) can generate callbacks. MOD features include two types of callbacks: (A) Set the phone to call when entry is made into a service number (MOD IN). (B) Set the phone to call when it is returned to service (MOD OUT).
	19	MOD IN NBR? 0 Should the pay phone call to report initiation of program modifications? If so, enter the number the phone should call. If not, clear the number by setting it to zero.
	20	MOD IN VOICE? Y If Y (9 for yes), when program modifications occur, you receive a spoken report. If you're using a modem, enter N (6 for no).

SERVICE NUMBER	CODE NUMBER	FEATURE OR APPLICATION
09 (cont'd)	21	MOD IN CLR'D? N This feature reports the day and time when the program was last modified. The example LAST 156 12:33? N cites day 156 of operation at 12:33. The clearing procedure is the same as that for feature 03.
	22	MOD VIO NBR? 0 Should the pay phone call to report an unauthorized attempt to modify the phone's program? If so, enter the number the phone should call. If not, clear the number by setting it to zero.
	23	MOD VIO VOICE? Y If Y (9 for yes), when a program violation occurs, you receive a spoken report. If you're using a modem, enter N (6 for no).
	24	MOD VIO CLR'D? N This feature reports the day and time of the last program violation. The example LAST 156 12:33? N cites day 156 of operation at 12:33. The clearing procedure is the same as that for feature 03.
	25	MOD OUT NBR? 0 Should the pay phone perform a callback after it is restored to service? If so, enter the number the phone should call. If not, clear the number by setting it to zero.
	26	MOD OUT VOICE? Y If Y (9 for yes), when phone service is restored, you receive a spoken report. If you're using a modem, enter N (6 for no).
	27	MOD OUT CLR'D? N This feature reports the day and time when the housing was last closed (after programming). The example LAST 156 12:33? N cites day 156 of operation at 12:33. The clearing procedure is the same as that for feature 03.
	28	BAD HARD NBR? 0 Should the pay phone call to report a hardware failure? If so, enter the number the phone should call. If not, clear the number by setting it to zero.

SERVICE NUMBER	CODE NUMBER	FEATURE OR APPLICATION
09 (cont'd)	29	BAD HARD VOICE? Y If Y (9 for yes), when phone diagnostics detect bad hardware, you receive a spoken report. If you're using a modem, enter N (6 for no).
	30	BAD HARD CLR'D? N This feature reports the most recent hardware error. BAD HARD CLR'D means that no errors have occurred since the error report was cleared. The example LAST #15? N means that the last hardware error was number 15. CALL #15 means the phone is calling to report error 15. See the hardware error table below. This feature's clearing procedure is the same as that for feature 03.
	31	80% NBR? 0 Should the pay phone call to report that the cashbox is 80 percent full? If so, enter the number the phone should call. If not, clear the number by setting it to zero.
	32	80% VOICE? If Y (9 for yes), when the cashbox is 80 percent full, you receive a spoken report. If you're using a modem, enter N (6 for no).
	33	80% CLR'D? N This feature reports the day and time when the cashbox became 80 percent full. The example LAST 156 12:33? N cites day 156 of operation at 12:33. The clearing procedure is the same as that for feature 03.
	34	100% NBR? 0 Should the pay phone call to report that the cashbox is 100 percent full? If so, enter the number the phone should call. If not, clear the number by setting it to zero.
	35	100% VOICE? If Y (9 for yes), when the cashbox is 100 percent full, you receive a spoken report. If you're using a modem, enter N (6 for no).
	36	100% CLR'D? N This feature reports the day and time when the cashbox became full. The example LAST 156 12:33? N cites day 156 of operation at 12:33. The clearing procedure is the same as that for feature 03.

Error Numbers Used in Bad Hardware Callbacks

NO.	DISPLAY	MAJOR?	NO.	DISPLAY	MAJOR?
3	ASAP RESPOND ERROR!	Yes	21	KEY 1 ERROR!	No
4	ASAP TAKE ERROR!	Yes	22	KEY 2 ERROR!	No
5	DTMF ERROR!	Yes	23	KEY 3 ERROR!	No
6	RAM ADDR ERROR!	Yes	24	KEY 4 ERROR!	No
7	RAM DATA ERROR!	Yes	25	KEY 5 ERROR!	No
8	U1 ROM ERROR!	Yes	26	KEY 6 ERROR!	No
9	U2 ROM ERROR!	Yes	27	KEY 7 ERROR!	No
10	U3 ROM ERROR!	No	28	KEY 8 ERROR!	No
11	U4 ROM ERROR!	Yes	29	KEY 9 ERROR!	No
12	PIA ERROR!	Yes	30	KEY * ERROR!	No
13	CLOCK C22S ERROR!	Yes	31	KEY # ERROR!	No
14	CMOS CKSUM ERROR!	Yes	32	KEY 5¢ ERROR!	No
15	CLOCK SET ERROR!	No	33	KEY 10¢ ERROR!	No
16	CLOCK 512HZ ERROR!	Yes	34	KEY 25¢ ERROR!	No
17	IRQ ERROR!	Yes	35	U5 CKSUM ERROR!	No
18	SPEECH ERROR!	Yes	36	U5 BAD ERROR!	No
19	FIRQ ERROR!	Yes	37	MISSING HANDSET ERROR	No
20	KEY OPER ERROR!	No	38	ASAP RINGING ERROR!	Yes
			39	ASAP MISC ERROR!	Yes
			40	MISREAD CLOCK CHIP!	No
			41	WATCHDOG ERROR!	Yes

NOTICE

UNDERSTANDING ERROR NUMBERS. With hardware callbacks, your phone uses error numbers (see table) instead of describing its problem. This technique keeps callbacks short and simple. Especially if you own several phones, you'll appreciate brief callbacks! Also as a convenience to you, the phone attempts to call you several times. In fact for each problem, it tries 15 times over three days.

AN EXAMPLE OF A CALLBACK is "111-222-3333. This telephone is out of order: 31." Your pay phone begins its message with its number. Your phone ends its message with the error number of its problem. In the example, the pay phone's keypad has a bad # key.

MAJOR PROBLEMS. Some problems, such as main-system failure or a dead speech chip, affect callbacks. Your phone may try to call but may not be able to complete the process. Whether or not you receive a callback depends on the cause and extent of damage. Such "major" problems are distinguished in the right column of the table above.

FURTHER INFORMATION. The callbacks in this table, plus a number of others are discussed in Chapter 5.

SERVICE NUMBER	CODE NUMBER	FEATURE OR APPLICATION
10 Holiday Tables	CONCEPT	Holidays only apply to discounted calls. Including the rate chip's year of release, the chip contains three years of holidays. You may add holidays. But rate chip holidays can't be deleted. Not all calls follow the same holiday schedule. (For example, calls to Canada and calls within the United States sometimes carry different rates. This is the case when one country celebrates a national holiday.) Holiday tables are grouped according to how a holiday affects phone rates. For example, a holiday may affect intralata, interlata or local rates.
		PROCEDURE FOR ADDING HOLIDAYS
	1-9	[ ] A. Select one of nine additional holiday tables. At the prompt WHICH HOLI TBL? enter a single digit from one through nine. [ ] B. In each holiday table, there are five blanks where you can enter holidays. Choose one of these blanks by entering a single digit from one to five. For example, at the prompt HOLI TBL #1, enter 4. [ ] C. Enter the two-digit month and two-digit day as a single number. For example, at prompt HOL #4? 0 enter May first as 0501. [ ] D. To enter additional holidays in this table, press #. Proceed from step B. [ ] E. To enter holidays in another table, press # twice. Proceed from step A.

SERVICE NUMBER	CODE NUMBER	FEATURE OR APPLICATION
11 Hour Tables	CONCEPT	The hour tables apply to discounted and full-rate calls. Throughout any week, rates can be adjusted on an hourly basis. Military time (Hour 0 for 12 midnight, through hour 23 for 11 p.m.) is used. The hour tables are below.
	1-9	PROCEDURE FOR ADDING HOURS [ ] A. Select one of nine additional hour tables. At the prompt WHICH HOUR TBL? enter a single digit from one through nine. [ ] B. At each hour in the table, there is a blank where you can enter a rate. CHOOSE ONE of these blanks by entering a single digit from one to five. For example, at the prompt HOUR TBL #1, enter 4. IF YOU DON'T KNOW WHICH BLANK you want, browse with the * key. Repeatedly press * until you find the day and hour combination you desire. For example you may choose D#/M-F HR #0? 0. In English, this prompt means "for weekdays before 1 a.m., what rate do you desire?" [ ] C. Enter the one-digit rate. Suppose you're altering the rate for D#/SAT HR #0? 0. (This prompt means "for Saturdays between midnight and 1 a.m., what rate do you desire?") Enter a single digit from zero through three. (Zero denotes a full-rate call. The other three numbers are for discount rates.) [ ] D. To enter additional rates in this hour table, press #. Proceed from step B. [ ] E. To enter hours in another table, press # twice. Proceed from step A.

Hour Tables

No.	Weekday Rate	No.	Saturday Rate	No.	Sunday Rate	Time
1	D#/M-F HR #0?	25	D#/SAT HR #0?	49	D#/SUN HR #0?	midnight
2	D#/M-F HR #1?	26	D#/SAT HR #1?	50	D#/SUN HR #1?	1 a.m.
3	D#/M-F HR #2?	27	D#/SAT HR #2?	51	D#/SUN HR #2?	2 a.m.
4	D#/M-F HR #3?	28	D#/SAT HR #3?	52	D#/SUN HR #3?	3 a.m.
5	D#/M-F HR #3?	29	D#/SAT HR #4?	53	D#/SUN HR #4?	4 a.m.
6	D#/M-F HR #5?	30	D#/SAT HR #5?	54	D#/SUN HR #5?	5 a.m.
7	D#/M-F HR #6?	31	D#/SAT HR #6?	55	D#/SUN HR #6?	6 a.m.
8	D#/M-F HR #7?	32	D#/SAT HR #7?	56	D#/SUN HR #7?	7 a.m.
9	D#/M-F HR #8?	33	D#/SAT HR #8?	57	D#/SUN HR #8?	8 a.m.
10	D#/M-F HR #9?	34	D#/SAT HR #9?	58	D#/SUN HR #9?	9 a.m.
11	D#/M-F HR #10?	35	D#/SAT HR #10?	59	D#/SUN HR #10?	10 a.m.
12	D#/M-F HR #11?	36	D#/SAT HR #11?	60	D#/SUN HR #11?	11 a.m.
13	D#/M-F HR #12?	37	D#/SAT HR #12?	61	D#/SUN HR #12?	noon
14	D#/M-F HR #13?	38	D#/SAT HR #13?	62	D#/SUN HR #13?	1 p.m.
15	D#/M-F HR #14?	39	D#/SAT HR #14?	63	D#/SUN HR #14?	2 p.m.
16	D#/M-F HR #15?	40	D#/SAT HR #15?	64	D#/SUN HR #15?	3 p.m.
17	D#/M-F HR #16?	41	D#/SAT HR #16?	65	D#/SUN HR #16?	4 p.m.
18	D#/M-F HR #17?	42	D#/SAT HR #17?	66	D#/SUN HR #17?	5 p.m.
19	D#/M-F HR #18?	43	D#/SAT HR #18?	67	D#/SUN HR #18?	6 p.m.
20	D#/M-F HR #19?	44	D#/SAT HR #19?	68	D#/SUN HR #19?	7 p.m.
21	D#/M-F HR #20?	45	D#/SAT HR #20?	69	D#/SUN HR #20?	8 p.m.
22	D#/M-F HR #21?	46	D#/SAT HR #21?	70	D#/SUN HR #21?	9 p.m.
23	D#/M-F HR #22?	47	D#/SAT HR #22?	71	D#/SUN HR #22?	10 p.m.
24	D#/M-F HR #23?	48	D#/SAT HR #23?	72	D#/SUN HR #23?	11 p.m.

SERVICE NUMBER	CODE NUMBER	DISPLAY	MEANING
12 Restore or Clear Settings	CONCEPT	Use this service number to restore other service numbers to factory settings. With service number 12 you can also clear (zero) bookkeeping features. Except feature 8, each feature clears or restores a certain function of the phone. Some features clear or restore one line of a <u>feature</u>. Other features affect one or more <u>service numbers</u>. Enter Y (9 for yes) at the appropriate feature.	
	CAUTION	The manager or accountant should have exclusive access to this service number.	
	1	RESTORE ALL? N	Restores all factory settings.
	2	RESTORE RATES? N	Restores phone tariffs (hour tables, holiday tables, rate tables).
	3	RESTORE CONFIG? N	Restores service configuration, passwords, advertisements and callbacks.
	4	RESTORE PH #? N	Restores the phone mode.
	5	CLR $-DATE? N	Clears only the "dollars to date" figure.
	6	CLR BOOKS? N	Except for "dollars to date," this feature clears all bookkeeping features.
	7	CLR CALL BACK? N	This feature clears the 36 callback options.
	8	S#?	This is the location of your phone's 12-digit serial number.

Notes
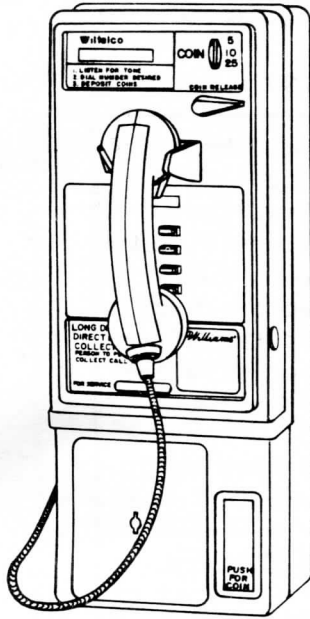
Chapter 5:
Troubleshooting Guide

Power-Up Diagnostics
Minimum System Tests
Checkmark Tests

Operation-Mode Tests
Phone Won't Power Up
Troubleshooting Switch Problems

Switch-Matrix Table
Summary of Unique Parts
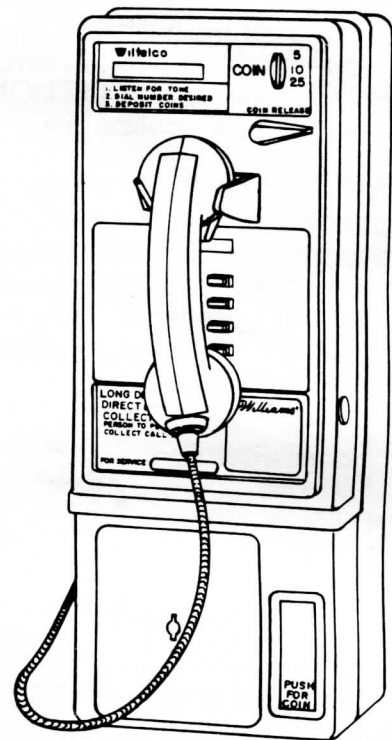
WARNING

LINE-COUPLER CIRCUITBOARD. Repairs to this board must not be made in the field. The Line-Coupler Board is type accepted by the FCC. For that reason, only factory service is permitted. Use your schematics only to help you isolate faults on the Line-Coupler Board. If you decide that your Line-Coupler Board is bad, return it *with your Analog Board* to the factory. The two boards are a matched set. Service on the Line-Coupler Board cannot proceed without its matched Analog Board. No other service is authorized or warranted.

Power-Up Diagnostics

Whenever your phone is powered up, a set of routines examines phone hardware. Failed tests may result in error indications and bad-hardware callbacks. (See SERVICE CALLBACK OPTIONS in Chapter 4.) Some power-up tests are informational and don't cause callbacks.

SYSTEM REQUIREMENTS. A damaged phone's capacity to diagnose its problems depends on what is damaged. As a minimum requirement, power-up tests demand one working computer. Your phone includes two computers (ASAP and main system). But they aren't interchangeable. If the ASAP malfunctions, the main system may be able to offer analysis. However if the main system is down, the ASAP can't diagnose the problem. For diagnostics to take place, the main system must operate. The main system consists of...

* microprocessor U1
* data, address and control busses
* system clock U18 and U15
* the display
* at least ROM U4 (main program)
* at least some of RAM U21

MINIMUM SYSTEM TESTS. The first tests your phone initiates require only the main system described above. These tests occur during the moment after power-up, while the display is fully illuminated. Although RAM and ROM are checked, passage of these tests also indicates main system operation. If your phone passes the Minimum System Tests, the Checkmark tests follow.

CHECKMARK TESTS. 15 of the power-up tests are called Checkmark Tests. Passage of these tests produces checkmarks starting at the right side of the display. Each checkmark is one character to the left of the last checkmark that appeared. The last checkmark appears at the left side of the display. A triangle to the left of the checkmarks indicates that a test is in progress.

TEST SYNOPSES. Minimum System and Checkmark Tests are described in order below. The top line of each test synopsis provides one test's name and error display. Under the error display is a brief summary of the test. If bad test results produce a callback, the summary's "CALLBACK" line reads "yes."

Minimum System Tests

CAUTION
RAM errors are critical. They can render the other tests unreliable or impossible. Promptly replace bad RAMs and repair bus problems.

NOTICE
RAM TESTS require an operating main system, including ROM U4.

* MINIMUM SYSTEM TEST 1: RAM ADDRESS ERROR (no checkmark)

TESTS:	ASAP RAM U36 and main system/display RAM U21 (static CMOS)
PROBABLE CAUSE:	Floating, shorted or open address, read/write (R/W) or chip-select (CS) lines. RAM could also be bad.
CALLBACK:	Yes, but system damage may prevent the call.

* MINIMUM SYSTEM TEST 2: RAM DATA ERROR (no checkmark)

TESTS:	CMOS, static RAMS U21 and U36. Indirectly tests transceiver U3, which is between the bus and U21.
PROBABLE CAUSE:	Floating, shorted or open data, read/write (R/W) or chip-select (CS) lines. Other possibilities include a bad RAM or a bad transceiver.
CALLBACK:	Yes, but system damage may prevent the call.

NOTICE

THE ROM TEST requires an operating main system. In addition, the following chips must be nominal: ROM U4 and RAMs U36 and U21.

* MINIMUM SYSTEM TEST 3: Various indications, depending on the bad chip... U1 ROM ERROR, U2 ROM ERROR, U4 ROM ERROR (no checkmark)

TESTS:	Checksums for ROMs U1, U2, and U4 on the ROM Board
PROBABLE CAUSE:	Floating, shorted or open data, address or chip-select (CS) lines. Could be a bad ROM.
CALLBACK:	Yes, but system damage may prevent the call.

ROM CONTENTS

ERROR INDICATION	CHIP FUNCTION
U1 ROM ERROR	secondary program chip
U2 ROM ERROR	speech chip
(none)	rate chip U3 (not tested)
U4 ROM ERROR	main program, diagnostics

Checkmark Tests

NOTICE

Checkmark tests require an operating main system. In addition, these chips must be nominal: ROMs U4 and U1, RAMs U36 and U21.

* CHECKMARK TEST 1: PIA ERROR

TESTS:	Connection between PIA (peripheral interface adapter) U5 and microprocessor U1 on the CPU Board
PROBABLE CAUSE:	Floating, shorted or open data, address, read-write (R/W) or chip-select (CS) lines. Rarely is the PIA bad.
CALLBACK:	Yes, but system damage may prevent the call.

* CHECKMARK TEST 2: CLOCK CMOS ERROR

TESTS:	Clock chip U18 for valid onboard CMOS memory
PROBABLE CAUSE:	Bad address or data lines, chip enables, read/write line, or bad memory (chip U18).
CALLBACK:	Yes

* CHECKMARK TEST 3: CMOS CKSUM ERROR

TESTS:	Clock chip U18, U36 CMOS RAM checksums
PROBABLE CAUSE:	Removing power with no batteries or removing power with low batteries. Other possibilities include a bad battery clip or bad diodes D8, D9 or D10. This problem will clear the callback status (forget callback messages), clear the dollars-to-date figure, and clear money in the cashbox.
CALLBACK:	Yes

* CHECKMARK TEST 4: CLOCK SET ERROR

TESTS:	Clock chip U18, clock settings: Is the clock running? Are the time and date reasonable? Is the day of the week numbered one through seven?
PROBABLE CAUSE:	The clock is stopped (day of week is 0). Discounted calls are always at full prices.
CALLBACK:	Yes

* CHECKMARK TEST 5: CLOCK 512HZ ERROR

TESTS:	Clock chip U18, 512Hz interrupt signal
PROBABLE CAUSE:	The 512Hz interrupt inside the clock chip did not occur. (This interrupt isn't related to the IRQ connection between U18 and U1.) The 512Hz line to microprocessor U12 may be shorted, open or intermittent. (Check pullup-resistor package SR6.) Occasionally clock U18 or crystal CR1 may fail.
CALLBACK:	Yes, but system damage may prevent the call.

* CHECKMARK TEST 6: IRQ ERROR

TESTS:	The IRQ (interrupt-request) line from clock chip U18 to microprocessor U1 on the CPU Board.
PROBABLE CAUSE:	Open or short circuit on IRQ line, bad SR1 pullup resistor. Occasionally clock U18 or crystal CR1 may fail.
CALLBACK:	Yes, but system damage may prevent the call.

* CHECKMARK TEST 7: SPEECH ERROR

TESTS:	Handshaking protocol between speech chip U8 on the Analog Board and microprocessor U1 on the CPU Board. System attempts to say a short word.
PROBABLE CAUSE:	Floating, shorted or open R/W (read/write) or SPEECHCS (speech chip-select) lines. Check for bad connector at 1J2 or 3J3. U8 speech chip or crystal CR2 on Analog Board might be bad. Also check for a bad U9 inverter or a bad electrolytic C36.
CALLBACK:	Yes, but a spoken message may not be possible.

* CHECKMARK TEST 8: FIRQ Error

TESTS:	Speech chip's REQ (interrupt-request) signal that should appear at microprocessor U1's FIRQ pin. U1 is on the CPU Board.
PROBABLE CAUSE:	Floating, shorted or open FIRQ line. Check for a bad CPU-Board connector 1J2 or Analog-Board connector 3J3. There might be problems elsewhere on the FIRQ line. For instance, suspect a bad pullup package SR1 on the CPU Board.
CALLBACK:	Yes, but a spoken message may not be possible.

* CHECKMARK TEST 9A: ASAP TAKE ERROR

TESTS:	Microprocessor U12; data bus, bits D0 and D1
PROBABLE CAUSE:	ASAP chip U12 (answer supervision, analog processor) on the CPU Board didn't take a command. Either the ASAP is bad or there's a bus problem involving handshaking bits D0 and D1.
CALLBACK:	Yes

* CHECKMARK TEST 9B: ASAP RESPOND ERROR

TESTS:	Microprocessor U12; data bus, bits D0 and D1
PROBABLE CAUSE:	ASAP U1 (answer supervision, analog processor) on the CPU Board doesn't respond to a command. The problem could be handshaking bits D0 and D1 between microprocessors U1 and U12. Also, the 512Hz clock signal may be missing from U1's NMI (non-maskable interrupt) terminal. Since it passed test 9A, U1 might be intermittent.
CALLBACK:	Yes

* CHECKMARK TEST 9C: ASAP $FF ERROR

TESTS:	Microprocessor U12; data bus
PROBABLE CAUSE:	Data bits are stuck low.
CALLBACK:	Yes

* CHECKMARK TEST 9D: See below

TESTS:	Data bus (and devices connected to it). The test proceeds in the order shown in the table. When the first stuck bit is detected, the test aborts. At this point the error message is displayed. Other bits are not tested.
PROBABLE CAUSE:	See the table below.
CALLBACK:	Yes

ERROR INDICATION	THIS BIT IS SHORTED HIGH:
ASAP $FE ERROR	Data Bit 0
ASAP $FD ERROR	Data Bit 1
ASAP $FB ERROR	Data Bit 2
ASAP $F7 ERROR	Data Bit 3
ASAP $EF ERROR	Data Bit 4
ASAP $DF ERROR	Data Bit 5
ASAP $BF ERROR	Data Bit 6

* CHECKMARK TEST 9E: ASAP CLICK ERROR

TESTS:	Click detector on the Analog Board: This circuit includes dynamic filter and A/D converter U1, plus adjacent components.
PROBABLE CAUSE:	Click detection occurred despite a silent line. Adjust click-detect potentiometer R15.
CALLBACK:	Yes

* CHECKMARK TEST 9F: ASAP TELCO ERROR

TESTS:	ASAP circuit
PROBABLE CAUSE:	An improbable error. ASAP detects one of three telco (telephone company) tones on a silent line.
CALLBACK:	Yes

* CHECKMARK TEST 9G: ASAP RING ERROR

TESTS:	ASAP circuit
PROBABLE CAUSE:	ASAP detects a ringback tone on a silent line.
CALLBACK:	Yes

* CHECKMARK TEST 9H: ASAP BUSY ERROR

TESTS:	ASAP circuit
PROBABLE CAUSE:	ASAP detects a busy tone on a silent line.
CALLBACK:	Yes

* CHECKMARK TEST 9I: ASAP ANSWER ERROR

TESTS:	ASAP circuit
PROBABLE CAUSE:	ASAP detects speech on a silent line.
CALLBACK:	Yes

* CHECKMARK TEST 9J: ASAP RINGING ERROR

TESTS:	ASAP circuit
PROBABLE CAUSE:	The phone is continuously ringing.
CALLBACK:	Yes

* CHECKMARK TEST 10A: U5 REPAIRED

TESTS:	Checksum of EEROM U5 on the ROM Board
PROBABLE CAUSE:	Data in U5 was modified, but the program recovered the data. Power-up or power-down glitches may have produced spurious data in U5.
CALLBACK:	No

* CHECKMARK TEST 10B: U5 CKSUM ERROR

TESTS:	Checksum of EEROM U5 on the ROM Board
PROBABLE CAUSE:	The phone can't understand the data in U5. Attempting to remain in service, the phone will restore adjustable features to factory settings.
CALLBACK:	Yes

* CHECKMARK TEST 11: NEW RATE ERROR

TESTS:	Rate-table data
PROBABLE CAUSE:	(1) You've just changed rate chips.
	(2) Your rate chip is bad.
	(3) Your phone's area code and exchange don't match rate-chip data.
	(4) Your phone's area code doesn't match rate-chip data (only with Version-1.0 firmware).
CALLBACK:	No

* CHECKMARK TEST 12: U5 BAD ERROR

TESTS:	EEROM U5 on the ROM Board
PROBABLE CAUSE:	(1) Someone set service number 02, feature 26 (U5 BAD? Y) to yes.
	(2) If 02, 26 was set to yes by the phone, U5 probably needs to be replaced. U5 is a EEROM. Any memory location can only be altered about 10,000 times. After its limit is reached, U5 must be replaced.
NOTICE:	U5 contains most programmable data. However, other programmable data is stored CMOS, static RAM. Some of this CMOS memory (U18 only) is battery backed. CMOS data includes the clock, bookkeeping, callback status, error messages and clears.
CALLBACK:	No

* CHECKMARK TEST 13: DTMF ERROR

TESTS:	DTMF transceiver U6 on the Analog Board
PROBABLE CAUSE:	U6 either didn't report its readiness or required too much time to produce a tone. Check for a bad U6 or bad crystal CR1. Also check for missing pulses at U6's chip-select (CS), read-write (R/W) or E-clock (02) lines.
CALLBACK:	Yes, but the phone may not be able to dial out.

* CHECKMARK TEST 14: See below

NOTICE:
This test is only performed if Demo Mode is enabled (Y). See Chapter 3, service number 02, feature 18.

TESTS:
Analog multiplexer U7 on the Analog Board and four circuits at U7's inputs. The devices are individually tested. Each is turned off to produce silence. If a device is noisy, an error results. If silence occurs, then the device is turned on and noise is detected. If there is no noise, an error indication results. If noise is detected, a device is presumed functional.

PROBABLE CAUSE:
See the table below.

CALLBACK:
No

ERROR INDICATION	BAD CONNECTION
SIGNAL L0-J2 ERROR	Speech to phone line
SIGNAL L1-J2 ERROR	Speech to earpiece
SIGNAL L4-J2 ERROR	DTMF to phone line: dial mode
SIGNAL L5-J2 ERROR	DTMF to phone line: voice mode

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* CHECKMARK TEST 15: Any of these error messages....KEY OPER ERROR!, KEY 1 ERROR!, KEY 2 ERROR!, KEY 3 ERROR!, KEY 4 ERROR!, KEY 5 ERROR!, KEY 6 ERROR!, KEY 7 ERROR!, KEY 8 ERROR!, KEY 9 ERROR!, KEY * ERROR!, KEY # ERROR!, KEY 5¢ ERROR!, KEY 10¢ ERROR!, KEY 25¢ ERROR!

TESTS:
Keypad switches

PROBABLE CAUSE:
If a keypad key is closed during power-up, the routine assumes it's stuck. Unsticking the key returns the phone to service. Beware of multiply stuck keys. When three keys are stuck, the third can cancel indications that two more are stuck.

CALLBACK:
Yes

Operation-Mode Tests

Operation-Mode Tests take place whenever the phone is operating. From the completion of the power-up tests to shutdown, the phone undergoes periodic testing. The numbering of these tests does not reflect the order in which they're performed.

* OPERATION-MODE TEST 1: WATCHDOG ERROR

TESTS:	Watchdog pulser U39 and associated components on the digital board
PROBABLE CAUSE:	During shutdown the program determines if everything is ready to be turned off. Then it stops resetting the watchdog circuit so that a hardware reset can occur. The reset must occur within 1.5 seconds. Otherwise the watchdog did not pulse the microprocessor and PIA reset lines low. The program displays an error message and then performs a "warm start." Unfortunately, a warm start doesn't reset DTMF U6, PIA U5 or ASAP U12. (U6 is on the Analog Board. The other two chips are on the CPU Board.) Moreover, other hardware connected to the reset line isn't reset either. However sometimes a warm start can restore system operation.
CALLBACK:	Yes, but system damage may prevent the call.

* OPERATION-MODE TEST 2: Various; for example, SWI2 ERROR $E4D5

TESTS:	Software, including 512Hz-clock U18 software (all timing derives from U18 on the CPU Board).
PROBABLE CAUSE:	Software error. This error necessitates shutting down the phone. The test even states the memory address where the error occurs (in the example above, hex address E4D5).
CALLBACK:	No

* OPERATION-MODE TEST 4: ASAP CRASH

TESTS:	Microprocessor U12 (ASAP) on the Digital Board
PROBABLE CAUSE:	ASAP didn't respond. In an attempt to make ASAP functional, the system shut down. U12, or one of the bus or control lines it uses may be bad. If ASAP never becomes functional, repeated shutdowns will occur.
CALLBACK:	Yes, but system damage may prevent the call.

Phone Won't Power Up

WHAT CAN I DO? Supposing your phone doesn't even run the Minimum System Tests. Or maybe it was operating until five minutes ago. Then its display faded into oblivion. Although they can't produce a callback, these symptoms are a type of "error message" too. We'll treat them in a separate test category...

* NO-FUNCTION TEST 1: (no display)

TESTS:	Logic supply, main system function
PROBABLE CAUSE:	Bad fuse F1 (2ASB, 250V) or leaky capacitor C2 on the Power-Supply Board. Also might be +5VDC regulator Q4 and Q7, clock U18 or microprocessor U1 on the CPU Board. Check power connectors 4J4 and 1J6.
CALLBACK:	No

* NO-FUNCTION TEST 2: (no display)

TESTS:	Display power supply, Display Board
PROBABLE CAUSE:	Bad zener ZR2 or ZR1 or leaky capacitor C4, C5, C6 or C7 on the Power-Supply Board. +5VDC regulator Q4 and Q7 or microprocessor U1 on the CPU Board. Check power connector 4J3 and the power wires to the display tube. Also check filament-resistors R1 and R2 on the Display Board.
CALLBACK:	No

Troubleshooting Switch Problems

USE YOUR SWITCH-MATRIX TABLE. Distinguishing a bad switch from a bad chip or a bad line can be very difficult. The Switch-Matrix Table below makes the job quite a bit easier. This table provides you with troubleshooting information on your phone's switch wiring. From this table you can locate...

* Each switch's matrix number.
* A switch's row and column numbers.
* The colors of a switch's row and column wires. (A wire's base color is first. The color of its stripe is second.)
* The PIA function that corresponds to a switch's row (PIA input) and column (PIA output). These functions have the prefix PA- for columns, and PB- for rows. The bar over the PA- denotes "not" (active-low signal).

Switch Matrix Table

	Column 0 GRN-BRN (PA0)		Column 1 GRN-RED (PA1)		Column 2 GRN-ORN (PA2)	
Row 1 WHT-BRN (PB0)	1	01	2	09	3	17
Row 2 WHT-RED (PB1)	4	02	5	10	6	18
Row 3 WHT-ORN (PB2)	7	03	8	11	9	19
Row 4 WHT-YEL (PB3)	*	04	0	12	#	20
Row 5 WHT-GRN (PB4)	5c	05	Switchhook	13	Not used	21
Row 6 WHT-BLU (PB5)	10c	06	Upper security switch	14	Not used	22
Row 7 WHT-VIO (PB6)	25c	07	Lower security switch	15	Not used	23
Row 8 (Not wired)	Not used	08	Not used	16	Not used	24

Summary of Unique Parts

BOARD	PART	PART NUMBER
CPU	Board assembly	D-11057
	3V Lithium battery	5880-11056-00
	Battery holder	5881-11057-00
	4.1943 MHz crystal	5520-10961-00
	MJ2955, PNP transistor	5191-10491-00
	Heatsink for MJ2955	5705-10162-00
	6818ACP clock/RAM	5313-10958-00
	EPROM U35	A-5343-5000-1
	74HC138 HCMOS decoder	5311-10948-00
	74HC139 HCMOS decoder	5311-10949-00
	74HC157 HCMOS decoder	5311-10950-00
	74HC161 HCMOS binary counter	5311-10951-00
	74HC245 HCMOS octal transceiver	5311-10953-00
	68SC21I HCMOS PIA	5312-10957-00
	5517I CMOS RAM	5340-10959-00
ROM	Board assembly	C-11067
	EPROM U1	A-5343-5000-3
	EPROM U2	A-5343-5000-4
	EPROM U3	A-5343-5000-5
	EPROM U4	A-5343-5000-2
	EEROM U5	5345-10979-00
Analog	Board assembly	D-11059
	3.84 MHz crystal	5520-10969-00
	3.579 MHz crystal	5520-10970-00
	DTMF chip MT8880	5312-10965-00
	Switch array MT8804	5314-10966-00
	3303 operational amplifier	5370-10968-00
	LM224 quad comparator	5370-10993-00
	LM389 op amplifier	5370-10995-00
	LM211 comparator	5370-10996-00
	LM1558 dual op amplifier	5370-11060-00
	MEA8000 speech synthesizer	5433-10967-00
	100 uH inductor	5551-11069-00

BOARD	PART	PART NUMBER
Power Supply	Board assembly V68MA38 varistor 220 uF, 200V capacitor	D-11071 5017-11023-00 5040-10792-00
	47 uF, 100V capacitor PCB-mount Xformer: 4 sec'y 24VAC wall-mount Xformer	5040-11025-00 5610-11024-00 5610-11062-00
	0.1 uF, 500V capacitor 2N5550 NPN transistor 2N5401 PNP transistor	5043-09072-00 5164-10998-00 5194-10997-00
	7824BT +24VDC regulator	5250-10999-00
Display	Board assembly Vacuum fluorescent tube 6118A2 High-voltage buffer	C-11069 5670-11020-00 5680-10988-00
Line-Coupler	Board assembly 2N7000 NFET H11G2 opto coupler	C-11072 5740-11012-00 5490-11011-00
	2.2 mH inductor 130V, 10J varistor 330Hz-3kHz transformer	5551-11018-00 5017-09044-00 5610-11009-00
	Relay	5373-11010-00

Cabinet	Front housing, incl.:
	  Front switch
	  Phone-number cover plate
		D-11079
		5647-11061-00
		01-8332

	Top lock
	  Display-window mtg plate
	  Inside display window
		20-9509
		01-8399
		03-8017-1

	Outside display window
	  Information window
	  Handset holder
		31-1384-5000-1
		03-8018
		34-1007

	Coin-rel actuator cam
	  Coin-rel actuator spring
	  Coin release lever
		34-1009
		34-1010
		34-1011

	Keypad faceplate Keypad window	34-1013 34-1014

BOARD	PART	PART NUMBER
Cabinet (cont'd)	Rear housing, incl.:	D-11080
	Vault lock with switch	B-11081
	Lower lock with key	20-9513
	Coin mechanism barrier	01-8404
	Top lock and key	20-9510
	Cashbox	20-9511
	T wrench	20-9514
Keypad	Board assembly	C-11073
	Keypad dialer	34-1019
	6V piezo buzzer	5101-11047-00
Cables	Display data cable	5795-11053-00
	Keypad data cable	5795-11054-00
	Interboard ribbon cable	5795-11055-00
	Phone-line cable	H-11182
	Display power cable	H-11084
	Main power cable	H-11085
	Power cable	H-11192

Notes
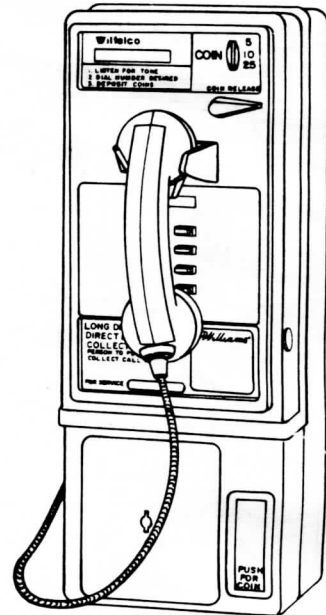
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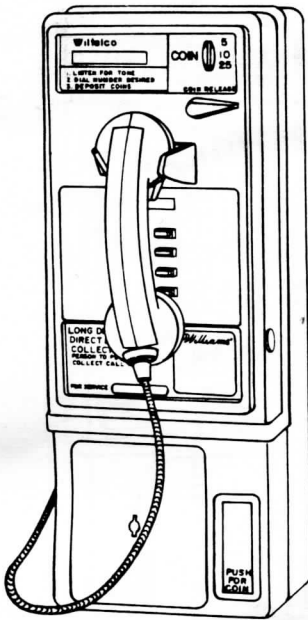
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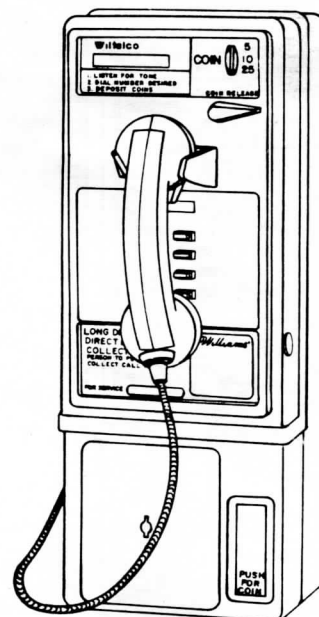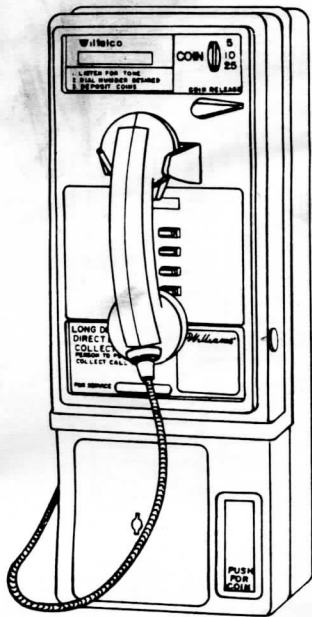
Notes

Notes

Summary of Major Devices, continued

CHIP NO.	TYPE	NOTES	BOARD	ERROR DISPLAY	CHIP FUNCTION	PART NO.
U1	68B09	16/8 bit	CPU	Two dashed, horizontal lines	MPU for Main System	5400-11051-00
U5	68SC21	16 bit	CPU	U5 ROM ERROR; display blinks	CMOS PIA	5312-10957-00
U2	LM389N	--	Analog	THIS TELEPHONE COULD NOT GET A DIAL TONE	Op amp	5370-10995-00
U6	MT8880AE	--	Analog	DTMF ERROR	DTMF Transceiver	5312-10965-00
Fuse	8AG	--	Power Supply	Blank display	2ASB, 250V	5731-08665-00
Line	--	Phone Line unplugged inside phone	Line-Coupler	THE PHONE LINE IS NOT OPERATING AT THIS TIME	--	--

NOTICE
  TO ORDER A REPLACEMENT ROM from your authorized *WILTELCO* distributor, specify: (1) part number (if available); (2) ROM label color; (3) revision number from ROM label; (4) telephone model where ROM is used. (5) U3 only: If you need a rate chip, specify your pay phone's area code and exchange.